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The Tuberculin Test*

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It is strange that I should be here to talk to you on this subject when, as many of you know, at the last meeting I made the manifestly well-founded statement that I knew nothing about it. But "Fools rush in where angels fear to tread," as you are about to perceive. Since that day I have looked through a good many back numbers of *The Veterinary Record*. My first reaction to that was a strong desire to congratulate the Editorial Committee on its creation of a wonderful treasure-house, and ourselves on having such a store. My researches proceeded, and a rather deep trough of depression overtook me as I realised that no brilliant idea nor profound thought which it had pleased me to think my own, but it had been born earlier in some other mind and had received quite adequate expression in a journal open to all. There seemed so little to be added by way of fact or expression, that it was in a somewhat forlorn frame of mind I prepared the paper now presented, in fulfilment of an undertaking, rather than hope of achievement.

When our Secretary nailed me down on behalf of the Association, he added a footnote of his own: "Would it be possible to include a few remarks on tuberculin-testing pigs?" Regretfully, I must put that complication on one side, as it hardly falls into line with my scheme, but there was a sound and comprehensive paper about it read by H. Burrow at the Congress of 1939, and published in the *Record* of August 26th, 1939. Since, happily, the testing of swine seems to have been less liable to upheavals than that of bovines, the paper stands as a very good guide to-day. Apart from that, there are, no doubt, some here this afternoon who have had recent experience of the tuberculin testing of swine, and if they would give us, during the discussion the benefit of that experience, it would be welcome to all of us and would also serve to put me a little more at ease with Mr. Spratling.

The tuberculin test was devised by Robert Koch in 1890—about two years before the first performance of "Charley's Aunt"—and is still running. A feat of endurance such as that is a guarantee of inherent good quality.

The test was first used as a diagnostic agent in *cattle* in 1891 (in Russia) and already in that same year we find Bang remarking "It is found that the tuberculin test is no more perfect than are other things in this world. Sometimes it fails. Animals with a very real degree of tuberculosis will sometimes fail to react, and the same applies to animals with a very slight degree of the disease. Further, a positive reaction has been observed several times in animals in which no tuberculous changes were found on examination of the organs when the animals were slaughtered." So you see, our troubles are not exactly new, nor have they arisen solely in connection with the use of any particular modern brand of tuberculin, or method of application. Bang continues, "but it would be the greatest folly to reject the method because it is not able to give everything we desire."

It is recorded that the intradermal method was first used in 1908 (by Moussu), but for years after that the subcutaneous test was the one almost exclusively used in this country, though sometimes in conjunction with the ophthalmic. When trade revived after the 1914-18 war, the South African Government required that all cattle imported into the Union from Great Britain should be tested in this country before export; the test prescribed was a simultaneous one embodying three methods, subcutaneous, ophthalmic and intradermal, and between 1919 and 1923 several hundreds of pedigree animals were tested under these regulations, the caudal fold being used as the site for the intradermal injection. By this time, the intradermal method was being used to some extent by practitioners in this country, but the important development came a little later with the introduction of the double intradermal test, which has been the foundation of our testing for nearly 20 years.

There have been other methods in use from time to time besides those mentioned. All had their advocates, but they do not seem to have had any notable advantages and are not likely to be revived as standard tests. There have also been changes in the method of manufacture of tuberculin, some of them of considerable importance. I do not propose to go into that part of the subject, however interesting it might be—most of us use what comes to us in a bottle, and we are more concerned with the kind of thing it does than with any relationship between that and the details of manufacture. (You may, without blame, think that trite phrase a poor excuse for an indolent essayist's evasion.)

There has been a tendency on the part of many of us to look backward with regret to earlier methods, investing them with qualities I do not believe they ever possessed. Particularly every now and then there arises a little agitation to canonise the subcutaneous method. Well, Dame Subcutaneous may have had her points, but she was never a saint. There were troubles enough when she reigned alone and if there are more troubles to-day, it is mainly because of two factors: (1) the intradermal test brings in to a much greater extent the variations in application and interpretation, due to what we call the human element; and (2) there has been in recent years a large increase in the number of cattle submitted to the test. It might be added that, partly as a result of organised schemes of eradication, the test has had to stand more of the limelight than it did in earlier days.

Before going any further, I think we should consider what it is we are asking for in a tuberculin. In that connection I will read to you one of several resolutions passed by the Society of Veterinary Practitioners at a meeting held on January 14th, 1942. Here it is:—

> "That the most pure and stable form of tuberculin be used at a standard potency; one which it has been shown detects the largest percentage of animals infected with bovine tuberculosis with little tendency to cause reactions in animals sensitised by other acid-fast organisms."

We must all agree that that is what we should like, though the sentiments seem to belong to prayer rather than resolve for, sadly enough, appearances are that any tuberculin sufficiently potent to detect a satisfactory percentage of animals affected with bovine tuberculosis is also liable to give reactions in animals sensitised by other acid-fast organisms, including the avian and human strains of *M. tuberculosis*, the organisms of Johne's disease and the so-called "so-called skin tuberculosis," various saprophytic acid-fasts and possibly a good many more not so well known or not known to us at all. And the list of sensitisers does not stop with the catalogue of acid-fasts. It has been suggested (with some evidence) that actinomycosis is one, and (with rather less) that brucellosis may be another. Then we are told that the larvae of more than one species of parasitic worm in their wonderful wanderings through the bovine body can not only set up plausible lesions in lymphatic glands, but also have the impudence to give a further imitation by sensitising to tuberculin.

A good deal of arduous work has been done in regard to the relationship of the pathogenic acid-fast organisms, and the degrees to which they will sensitise to each other's tuberculin (or corresponding product) or, if you like, the degrees to which they are specific to their own. If we could see them standing in order of that relationship we should probably find human and bovine fairly close together with Calmette-Guèrin in attendance (and possibly the vole bacillus, like a fidgety new boy, a trifle uncertain where to put himself); at a little distance would be another group led by avian and including Johne and perhaps some others less familiar to us.

That sounds fairly simple, but it is evidently accepted that the characteristics of the individual species are not entirely fixed. We constantly come across such expressions as "a bovine strain of low virulence"; "a highly virulent avian strain"; and I find this interesting reference: "Seven strains from Nigeria were also examined and though typically human to other tests, differed considerably in their pathogenicity to voles."

It may not matter much to us what the human strains do to the vole, but the passage quoted is further indication of possibilities of wide versatility on the part of various acid-fasts.

Thus in that picture of relationship our different species will not appear sharply defined and clear cut, black against a white background. Each stands in its own shadows and the shadows of any may overlap in varying degrees with those of its nearer and more distant relatives. Moreover, into this already not-so-clear picture intrude shifty uncultivated vagrants, such as the skin-nodule fellow, suspected of dual personality, and across it with a hop, skip and jump streak the saprophytes and, though the effect may be transient, their antics serve further to blur the outlines.

* Presented to the Royal Counties Division, N.V.M.A., at Reading, April 28th, 1944.

It is asking too much of a tuberculin that it should follow its own quarry without deviation through this haze. To look for perfect specificity in a tuberculin is to chase a will-o'-the-wisp; and even if we found this model agent which could keep to a knife-edge of specificity, we should also find that the austere detective would have nothing to do with any but the most pure and high-caste forms of infection, rejecting all others as untouchables. In dealing with a varying disease this visionary, unvarying, incorruptible tuberculin would be no better than the low-potency tuberculins of the past.

It has been suggested that non-specific reactions may be dodged, controlled or detected by means of variations in dosage of tuberculin. No one would deny that reactions may vary in accordance with the amount of active material injected, and if we are told to put a volumetric dose of 1/10th or 1/20th of a cubic centimetre into the deeper layers of the dermis we will make that our earnest aim. But with the instruments available and the nature of the bovine and human animal, I do not see how we can be expected to achieve precise adjustments of dosage in volumes of 1/10th c.c. or less, especially in consideration of the necessity to maintain a certain degree of speed. There are, no doubt, individuals who have confidence in their own ability to make these fine adjustments, but even they seem to think it would be unwise to trust to their general achievement.

It also seems to be too much to hope, as some have done recently, that salvation would come from reversion to the caudal fold as a site for injection.

There are other directions in which effort might be applied in the search to find means to reduce the numbers of no-lesion reactors, such as systematic retesting—unfortunately a laborious process—on the assumption that in the bovine animal it is disease due to the bovine type of organism which gives rise to permanent skin-sensitivity and repeated positive reactions, while the non-specific or alien infections, whether themselves transient or not, soon lose the power of sensitisation both to their own and related tuberculins. The transitory non-specific reactions in young bovines, familiar to many of us, give at least a basis for speculation.

In 1938, Glover, in describing experiments which showed that the avian tubercle bacillus and the bacillus of Johne's disease do sensitise cattle to bovine tuberculin, stated that this allergy wanes after about 24 weeks.

An interesting article was published* some time ago by A. B. Crawford, of the U.S.A., on the subject of sensitisation in cattle caused by the human type of tubercle bacillus. I will read an extract:—

"The injection or feeding of human tubercle bacilli sometimes leads to the formation of tubercles, but the lesions when found are regressive, usually disappearing within a few months. A sensitisation to tuberculin usually develops as result of such exposure."

After details of experiment, the article continues:—

"A peculiarity in connection with the sensitisation was that as a rule only one reaction was obtained, this in spite of the fact that a local abscess at times persisted. In one case a cow was treated with a culture suspension of human tubercle bacilli, which was allowed to gravitate into one quarter of the udder through a rubber tube. A few months later a positive reaction was obtained, but eight subsequent tests during the eleven years following were negative, although virulent, human-type tubercle bacilli were excreted from the infected udder during the entire period of the life of this animal from 1901-1912."

As you see, that took place a long time ago, but it is still good enough to set one thinking along more than one line. The tuberculin used in the experiments derived from human strains, so was homologous to the infection, but the infection was alien to the host; hence, I suppose, the failure to cause persistent sensitivity. This looks as though the tuberculin, after consideration, decided the infection was non-specific to the cow, which seems praiseworthy enough—till we think of those virulent human-type bacilli being excreted in the milk during the entire eleven years!

Now, I meant to keep this cow out—there were others more suitable in that same article—but she insisted on coming into my paper somewhere, and I am not sure that my argument doesn't lose from her presence. Perhaps somebody can tell me?

The no-lesion reactors constitute what the Americans call a "high overhead" in eradication, and they are liable to be a discouragement to owners and others concerned. The complementary problem is that of the non-reacting affected animal. In some of these the lesions are found to be encapsuled, though even then they may contain live cultivable organisms. In others, disease has apparently been caused by a strain of organism of low virulence and it may be that a tuberculin requires relatively high potency in dealing with low virulence, though I do not suppose there is anything like a mathematical inverse ratio about it.

* A. B. Crawford. Symposium Series Vol. 1 of the American Association for the Advancement of Science, pp. 59-65.

There have been attempts to bring complement fixation to the aid of the tuberculin test, and in 1941 Hendershott and Johnson, of the U.S.A., drew attention to certain cellular changes in the blood which followed the subcutaneous inoculation of tuberculin into animals affected with bovine tuberculosis "whether or not they were allergic to tuberculin."

These researches and further work on specificity may in time lead to simplification, but it does not look like coming to the man in the field just yet, and when we consider the complexities of the problem, it does not seem likely that we shall be offered anything simpler than the comparative intradermal test, using a mammalian and an avian tuberculin, and I think we should accept that with a thankfulness that it is no worse.

I do not propose to go into details of the various methods of application of the tuberculin test, because although a practitioner may have freedom of choice on occasion, tuberculin testing for most of us most of the time consists of using the tuberculin provided and in the manner prescribed.

The official instructions are no doubt familiar to most of you. You may remember Circular 228 which, with one or two slight modifications, is what we are working on now, and you may also remember that Circular 228 soon after its appearance was stigmatised (to the accompaniment of laughter) as being "meant to be informative mainly to students." Well, perhaps older people are not so bright, but I must call your attention to the paraphrase of Circular 228 which appeared in *The Veterinary Record* of May 16th, 1942. This note was published, subject to the limitations imposed by the absence of herd histories, to provide practitioners with a guide to the interpretation of comparative tests undertaken privately. Although intended as a guide to the use of the original Weybridge tuberculin, it can be taken that the substitution of P.P.D. tuberculin has not altered the value of the guide in any material particular.

I have the note here, but do not propose to read it through, unless expressly asked to do so. There are, however, points which I wish to emphasise. One is the importance of the *site* of injection, particularly in a comparative test. Injections close to the shoulder give markedly poorer reactions than in sites nearer the head, so that unless the tuberculins are injected in equally favourable sites, the variation in the reaction due to site may be such as to invalidate the normal basis of interpretation. If the injections are made on the same side of the neck, they must be made equidistant from the point of the shoulder and in the middle third of the neck.

Another point is that in herds with well established non-specific infection, there are not infrequently delayed reactions to avian tuberculin, and observations up to 120th hour may avoid the necessity of retests in such instances.

Now, since this paper had its genesis in my own uneasy conscience following the last meeting of this Society, when there was some discussion on the testing of individual animals, I will go a little further in regard to private tests.

With private tests there are occasions when it is open to a practitioner to use the method of his free choice, but more often his choice is restricted or varied by the requirements of the client or the purpose for which a test certificate is required. In the case of herd tests, or test of groups of animals with a known history, the comparative test can with advantage be applied and interpreted on the lines laid down. In connection with the testing of single animals the official note says, "Seeing that the criteria applicable to the case of a herd test cannot be applied in interpreting the comparative test of single animals, such animals being tested for entry to sales should be tested sufficiently early to allow a retest to be carried out, should such prove necessary, before the date of the sale or closing of entries, as the case may be. In retesting such animals, it may facilitate interpretation to test a few animals of the same age group, as controls, if this is practicable."

Of course it is not always practicable to do it that way and when the test is of individual animals, or collections of animals, from unknown sources, the advice is: "The basis of interpretation to be provided must in the circumstances be well on the side of safety from the point of view of ensuring that animals with bovine infection are not classified as non-reactors."

My view is that the testing of individual animals of unknown origin is a practice normally to be discouraged. I have said that here before, and in spite of the risk of another mauling I am unrepentant, but all the same I do admit there are occasions when it is quite justifiable. In connection with the use of the comparative method for private or individual tests, I have noticed that the certificates given to owners are sometimes misleading, to the uninformed mind at least, and I know that they have actually misled. This is the kind of thing I mean:—

Avian	6	9	15	Positive
Mammalian ...	6	9	14	Positive

without any comment or explanation.

I have here a form of certificate which might meet the circumstances.

Suggested form of Certificate for use in cases of individual animals tested privately

(For use when an animal has given a mammalian positive or doubtful reaction and an avian positive or doubtful.)

TUBERCULIN TEST CERTIFICATE

(Comparative Tuberculin Test)

Note.—This test consists of the simultaneous injection of two different tuberculins—mammalian and avian—and comparison of the resulting reactions makes it possible to distinguish between infection with bovine tuberculosis and reactions due to other organisms.

Particulars of Intradermal Tuberculin Tests commenced on.....

Name of Owner of Animal.....

Address of Premises at which Animal is kept.....

.....

Name of Animal..... Breed.....

Identification Marks..... Age..... Sex.....

Tuberculin	Measurements					
	Before Injection	24 Hours	48 Hours	72 Hours	96 Hours	Result
Avian ..						
Mammalian						X

I interpret the result of the test as indicating that the animal is not affected with bovine tuberculosis.

.....R.C.V.S.

Date.....

You will notice that the column for recording "result" of the separate avian and mammalian tests has been struck out. I think it better that the word "positive" should not appear in a certificate which finally and essentially shows a negative result.

This proposed form of certificate is only given as a suggestion, and I should be glad to hear how it can be improved so that it may be of practical value.

To turn from the question of the individual animal, I have a few more remarks to make on the question of interpretation.

A few years ago, about the time when batch sixty-something was causing a little upheaval, I suggested at a meeting (of laymen) that certain apparently anomalous results might have arisen partly on account of differences in interpretation. One gentleman immediately squashed me with "Interpretation!—Nonsense! You put the stuff in, and it brings up a lump, or it doesn't, and that's the end of it." Well, it has not always worked out as simply as that with me, and I confess to having had doubts even before we were quite so aware of the nature of the forces against us; doubts, that is to say, not only in regard to the individual animal before me, but also doubts as to the basis of interpretation generally.

If you run through a number of *Veterinary Records* of a few years ago and find reports of papers and discussions on the tuberculin test, you will come upon the frequent repetition of the sentiment—"It is not the *size* of the swelling, but its *character* which matters." Questions of characteristics of swellings were discussed in considerable detail, and speaker after speaker came out in monotonous regularity with "It is not the size, but the character." "It is not the size, but the character." Well, heaven forbid that I should hold anybody responsible for what he said four or five years ago about the tuberculin test, but the echo of the words "not the size, but the character" still reverberates in our ears and may still have a meaning for some of us. My view is that size matters a lot more than any other character. Not only that, but the vocal meeting-room advocates of character (that is, most of us) found it difficult to ignore size when they got nearer to it. There is something real and convincing about a big swelling which makes it seem redundant to put it to searching character-test. There was seldom much quarrelling about those. It is within a comparatively small range of size that character has been brought in as a deciding factor and, as I think, with not much justification. In this connection there may be a difference between size and caliper measurement, particularly measurement by the usual "pinch" method, and it is conceded that an increase of 4 mm. on a "bean" may mean less than the same on a diffuse swelling. In the one case the measurement more accurately records the size than in the other, and I think it still is the size that matters. I am not alone in this. In *The Veterinary Record* of May 16th, 1942, a leading article contains the following straightforward statement: "The swelling at the site of a positive reaction is inflammatory in nature, it may well be a matter of chance whether the cells and fluid which collect at the site cause a firm or a soft swelling. With modern tuberculin the reaction swelling at the neck site, as in the caudal fold, varies in character. There seems to be no logical reason to deny the non-diffuse positive reaction; its occurrence has been demonstrated and must be accepted."

Another question concerning interpretation is—Who is to do it? In the case of private tests, naturally, the veterinary surgeon who does the test can do the interpretation—with or without help from guiding notes, as he pleases.

In the case of tests undertaken for official purposes, there has been a change since the introduction of the comparative method, for although the final decision was always made at headquarters, even in the days of mammalian tuberculin only, the decision rarely differed from that of the inspector in the field.

With the coming of the comparative test, that final decision which had formerly been exercised only occasionally, and as a kind of veto, became the first really effective decision in all cases. There is no disputing the fact that effective interpretation had been transferred from the practitioner (which in this connection includes also all inspectors, whole- and part-time) to the headquarters staff. I did not agree with that change, and I hope it may be possible for the position to be restored at a not-too-distant date. But the Ministry put forward powerful reasons in a statement appearing in the (already much quoted) issue of the *Record* dated May 16th, 1942.

"(*a*) In the circumstances in which the comparative test was introduced, there would be no predetermined basis of interpretation.

(*b*) In estimating the significance of a comparative test in any individual animal, and particularly in deciding on the action to be taken as the result of such tests, the past test history of the herd and the results of current tests in other animals in the herd must be given careful consideration. In view of the scale on which comparative testing is necessary, it would be not only inconvenient, but impracticable to supply Inspectors with all the earlier test records.

(*c*) Having regard to the absence of any definite basis of interpretation, a more accurate and uniform standard of judgment may be expected where the work is performed by a small staff under direct control at Headquarters than if entrusted to a large number of individuals in the field, some of whom have only a few herds to test.

(*d*) Modifications have necessarily had to be made from time to time, particularly in the earlier stages of its application, in the interpretation of the comparative test. Even now the position cannot be said to be stabilised, particularly since, as indicated earlier, certain changes in the tuberculin are being introduced. This reason, together with the need to consider the test histories, renders inadvisable any change from the existing practice of issuing the final interpretation from Headquarters."

Even a dissenter—and I do not claim to be the only one—must admit a certain amount of strength in these reasons. But there are drawbacks. Among these I should have put a weakening of the sense of individual responsibility, leading possibly to some carelessness in application and recording. But that foreboding does not seem to have been justified. I am assured that, with no more exception than would hang on any such general statement, although the field man has had occasion to deplore his position in this matter he has sustained with faith and integrity the part assigned to him.

The time must arrive when the comparative test and the basis of its interpretation will have reached at least an interim stabilisation, and the question of the re-allocation, on more normal professional lines, of the responsibility for interpretation will be ripe for revival and settlement. It is a question which should be approached from all sides with goodwill, and discussed without recrimination. It is not for me to go any further with that.

As to the scale of measurement figures which was issued in connection with the interpretation of the comparative test, I do not think anyone would deny something of the arbitrary in its composition, or claim for it an absolute and unalterable rectitude. All the same, I confess that it works out a lot better than I thought it would when it first appeared. Speaking with quite honest detachment, I consider it a remarkable achievement which, with a few modifications suggested by experience or on account of change of method, will long outlive the mildly derisive criticism which greeted its earlier appearance.

Now, after all this rigmarole, I come back nearly to my starting place. The test was devised in 1890 and is still running. It has suffered vicissitude and some abuse, and its essentials are still misunderstood by a considerable proportion of the people affected by its decisions. But much has been accomplished by its intelligent use during the different stages of its long run, which indicates a sounder quality at foundation than we have most of us allowed it during periods of sometimes excusable exasperation at its vagaries.

I do not envisage any momentous change of method in the immediate future. Possibly we may get a bovine tuberculin for general use instead of one prepared from human strains, and thus effect a gain in specificity (possibly not a tremendous one, but still a gain), and be released from the necessity to refer rather ambiguously to "mammalian"; and it may be that a single intradermal method will

replace the double, with or without some change in the hours of observation.

You will understand that I am not speaking of the more distant future, or denying the possibilities of far-reaching development; but, short of a kind of millennium, the trend will be for the tuberculin test to become more and more regarded as an *aid* in the eradication of tuberculosis from our herds, and less and less as something from which to produce a label to be attached to an individual animal.

The test and its problems will for some time to come constitute a matter of major importance to the veterinary profession, calling for co-operation, goodwill and forbearance on the part of all the sections concerned, as well as for painstaking zeal on the part of the individual. I do not despair of the issue.

Finally, I do not want there to be any misapprehension as to the responsibility for this paper. It has been neither officially inspired nor officially controlled. But, although no-one except myself has any responsibility for the views expressed, I have to acknowledge with gratitude the help and advice very willingly rendered by my colleagues both at headquarters and in the field, both whole- and part-time, the acknowledgment being deeply tinged with regret that I have been unable to turn the matter to any better account than to produce this conglomeration of half-gains and crude imaginings. My best hope is that in the discussion which is about to follow you will combine to wring a measure of truth and profit from this dim heap, enough to redeem the afternoon from total loss.

Discussion

Mr. R. R. Bugg: I should like to congratulate Mr. Brown on his most interesting and instructive paper. When asked to open this discussion I was somewhat awed. Having read Mr. Brown's essay I was overawed. I cannot accept his statement that he knows nothing about tuberculin testing, and one can but admire his painstaking search of the literature and his masterly exposition of a most difficult subject. Our secretary informed me that Mr. Brown had requested that a young and active practitioner be asked to open the discussion. I can claim the former qualification and perhaps am too active in the field to have time to acquire any scientific knowledge of the subject. In any case I am one of those unfortunate individuals who uses what comes along in the bottle and then attempts to pacify all concerned over the results it produces. I propose, then, to confine my remarks to the clinical aspects of testing and to leave it to better brains than mine to discuss the more scientific points.

Mr. Brown has dealt very ably with the question of specificity of tuberculins and this undoubtedly is the crux of the whole problem. I should like to ask him how far can we rely on the specificity of avian tuberculin. We are told, and there is ample evidence in support, that an animal with an avian infection is sensitised to bovine tuberculin, but just how far may the reverse apply and what degree of sensitivity to avian tuberculin might be expected in a beast affected with bovine tuberculosis?

I am not at all happy at the present criteria adopted for official interpretation of the comparative test—it seems altogether too easy. I think I am right in saying that the Ministry will allow a reaction to bovine tuberculin of 6 mm. over and above that to avian tuberculin, before classing the animal as a bovine reactor. I am aware that the bovine tuberculin is considerably more potent than is the avian, but I have repeatedly found that an animal giving a larger reaction to bovine than to avian tuberculin, be it only 1 or 2 mm., will eventually react at a later test. I have often advised clients to get rid of such animals which have been officially passed, for fear that they should spoil a future test.

My own view is that we should not allow anything worse than a level reaction to be classed as a negative and this I feel is the only interpretation which should be used when testing a herd for the first time. One would like to carry out such a test using bovine tuberculin only, but there would be a great danger of a large proportion of a good herd being scrapped, or of the owner being so discouraged as not to proceed with further testing.

I cannot agree with Mr. Brown that testing of individual animals for sale should be discouraged. There is a great demand for good quality T.T. cows which cannot be met by the existing licensed herds. I will agree that the use of the comparative test in such cases should be discouraged and my view is that the only safe test in animals for sale is the use of the bovine tuberculin alone. This of course is rather hard on the vendor, who is often denied a certificate for a perfectly sound healthy cow, but it is as safe as we can make such a test.

Mr. Brown has said that the extent of reaction may be controlled by variation of dosage. I wonder how far this is correct. We have all had the experience of running short of tuberculin during a test and have had to resort to reduced dosage to make the tuberculin go round—but we still get marked reactions with the reduced dose.

I must support Mr. Brown's contention that size of reaction is the important factor but I do think that consideration should still be given to character in what might be described as borderline cases. This latter in herds in which the testing history is known, and in individual animals tested with bovine tuberculin alone.

To conclude, I was very pleased to hear Mr. Brown's remarks on the question of headquarters interpretation, as this has long been a thorn in the side of the practitioner. The Ministry's arguments whilst sound enough must give way to the fact that the man on the spot is the one best qualified to make the decision.

Mr. N. P. Male asked what strains of tuberculin are used in the manufacture of mammalian P.P.D. tuberculin?

Mr. L. G. Anderson asked whether it was very important to make the two sites equidistant from the head and shoulder, as in practice this was often difficult to achieve.

He remarked that practitioners' interest in the test had been suppressed since they had been made into technicians and had been given no voice in the interpretation of their work.

Mr. F. R. Spratling thought that the most logical way of interpreting the test appeared to be either to consider the nature of the swelling only, or to consider measurements only and not to flounder between the two. He had been shocked when the Ministry first announced that all increases of 4 mm. were not negative, regardless of the nature of the swelling. He had since reconciled himself to this view by thinking of what sometimes happened when an abscess formed: they all knew that an abscess could be as hard as wood for a long time, before it softened. He thought, therefore, that the measurements only should be considered.

Dr. E. G. White answered this suggestion by emphasising that abscess formation and a reaction to a tuberculin were two entirely different processes, and that if the size of the swelling was to be the only criterion, the technique of the test and dose of tuberculin given should be exactly standardised.

He maintained that the dose of tuberculin was important only within limits, *e.g.* undiluted tuberculin compared with 1 in 100 tuberculin. Whether 0·1 c.c. or 0·05 c.c. tuberculin was injected would probably have little effect on the character of the swelling but might interfere with measurements.

Referring to P.P.D. tuberculin, he said that the aim was to prepare and issue a tuberculin which was as specific as possible and would give the maximum difference between reactions to the homologous and heterologous strains. It must give a very small swelling in a non-infected animal and a much larger one in an infected animal. It was hoped that the purer the product employed the more definite and specific would be the tuberculin test.

Mr. S. J. Edwards: The application of the tuberculin test in pigs presented no great difficulty. In a fairly docile herd it was possible to dispense with restraint in adult pigs, indeed it was advantageous to disturb them as little as possible. Young pigs could be huddled in a corner by means of a board and very soon they became quiet. The injection of tuberculin at the base of the ear was best made by means of a dental pattern syringe fitted with a needle measuring about 6 mm. Interpretation of reactions at the 48th hour presented no difficulty as a rule, since the positive reaction was characterised by an oedematous swelling with marked erythema, whereas there was nothing to denote the non-reactor.

Referring to the tuberculin test in cattle, it was truly remarkable that in certain clean herds such a large proportion of the animals showed sensitivity to avian tuberculin. He asked Mr. Brown whether in his view this sensitivity was indeed caused by the avian tubercle bacillus or that some other organism was responsible.

One would have to postulate a fairly heavy infection of wild birds to account for all the reactors encountered. While it might be possible to decide whether an animal was infected with either bovine or avian infection by means of the test, it was far more difficult to do so in the case of avian and Johne's infection.

[Messrs. H. Bell, E. J. Heather and H. S. Wright also took part in the discussion, but unfortunately their contributions have not been received.]

The Reply

Mr. Brown began his reply by thanking Mr. Bugg for opening the discussion so ably and at the same time letting him off so lightly. Although Mr. Bugg did not agree that the testing of individual animals was a thing to be discouraged, he actually did discourage it by his use of mammalian tuberculin only, which was liable to be a little hard on the vendor.

In reply to Mr. N. P. Male, the mammalian tuberculin ordinarily used in this country [and in the U.S.A.] was derived from human strains.

Mr. Brown assured the President (Mr. Anderson) that in the comparative test the site was of great importance and in spite of the difficulties one should try to adhere to the procedure laid down. He agreed with the President and Mr. Heather that the shifting of responsibility for interpretation had led to some loss of interest and possibly cramped discussion.

With reference to Dr. White's remarks, Mr. Brown said that a great deal of work was being done on the differentiation of proteid products of human, bovine and avian strains, but it would be some time before the results could be applied in the testing of cattle: he agreed with Dr. White that it was probably best to study the reaction swelling by itself and not to make assumptions on the parallel of ordinary inflammatory swellings.

To Mr. Manley and others who had asked about the caudal fold site he replied that he had had a good deal of experience of caudal fold testing and had some respect for the method, but did not think there would be any advantage in reverting to that site. He thanked Mr. Horace Bell for his graceful contribution to the discussion, but was not able to help him very much.

Several speakers had mentioned the use of avian tuberculin in the diagnosis of Johne's disease. Avian tuberculin had been used over a long period for this purpose—he himself had used it subcutaneously more than 20 years ago—and apparently it had some value.

In reply to Mr. S. J. Edwards, who had asked what was the cause of non-specific allergy to avian tuberculin, Mr. Brown said that the causes were many and various: nature seemed to have infinite resources in that direction. One Berkshire farmer went so far as to say that he had been told that a "bellyful of rye grass" would cause a reaction to avian tuberculin.

Mr. Brown ended by expressing his thanks to Mr. R. M. Davidson for his help in replying to questions concerning the details of interpretation of the tuberculin test.

UNIFORMITY IN STANDARDS OF POTENT SUBSTANCES

"Before war began certain efforts were made towards the production of an international pharmacopoeia with a view to securing the maximum uniformity in standards of potent substances," states the *Pharmaceutical Journal*, and continues: "Concurrently, and even since 1939, considerable progress has been made by a Committee of the League of Nations towards the unification of standards for vitamins, sera, digitalis, pituitary and other biological substances. But these results are only a beginning, indicating a principle which should be applied as far as possible to all medicinal substances. The work of the Committee of pharmacopoeial experts under the chairmanship of Dr. Hampshire, interrupted in 1939, will presumably begin again as soon as the European situation permits, but meanwhile there are matters within our own Empire which require to be put in order. Local conditions, preferences and practices may render some galenical preparations, especially ointments, which are in common use in Great Britain, unsuitable for other parts of the British Empire, and this fact justifies the production of local formularies. The same argument cannot be advanced, however, as a reason for changing standards of purity for single drugs and chemicals. Criteria of purity as determined by chemical tests and physical constants need not vary from country to country and certainly should not vary within the Empire. Where they do an immediate enquiry into the reason for the variation seems to be required."

* * * * *

Under the Town and Country Planning Act farm building plans will be brought under control and will have to be submitted to local authorities before new buildings can be erected.

In the House many Members supported an amendment to exclude farm buildings, but the amendment was negatived.

Tuberculin Testing in Cattle

Demonstration in Dublin*

By

J. M. MURPHY, M.R.C.V.S., D.V.S.M.,

Assistant Veterinary Inspector, Corporation of Dublin

Mr. Murphy first demonstrated the comparative test, using both avian and mammalian P.P.D. tuberculins, and secondly, the American double injection method of applying the intradermic test. [*Note.*—Double injection here refers to two injections, one in the caudal fold and the other in the vulva.]

He circulated amongst the members present a copy of a paper on "Technique in the application of the Intradermic Tuberculin Test" read by H. M. O'Rear, Veterinarian, Tuberculosis Eradication Division, Bureau of Animal Industry, United States Department of Agriculture at the New Jersey State Veterinary Association, Jersey City, N.J., January 13th and 14th, 1932. [*Note.*—This paper is reproduced below.]

Mr. Murphy also handed round to the members present a copy of the official method of comparative tuberculin testing used by the Ministry of Agriculture for Northern Ireland (also reproduced).

The demonstrator stated that he was indebted to Mr. T. M. Doyle, M.R.C.V.S., D.V.S.M., Deputy Director, Weybridge Laboratory, for the tuberculin used in the demonstration and also for a copy of the paper read by Mr. O'Rear, and further to Mr. H. G. Lamont, M.Sc., M.R.C.V.S., Head of Veterinary Research Division, Stormont, Belfast, for a copy of the Northern Ireland's Ministry's official method of comparative testing.

Mr. Murphy added that in compiling his notes references had been taken from two official publications issued by the British Ministry of Agriculture and Fisheries, April, 1942.

The demonstrator went to great pains in explaining the interpretation of the comparative test and also in demonstrating the inoculation of the tuberculin in the caudal fold and vulva sites in the manner prescribed in Mr. O'Rear's paper.

With regard to the cows used at the demonstration :—

Cow No. 1.—Had been tested with the comparative method and was showing the reactions at the 96th hour, the readings being :—

Avian Tuberculin			Mammalian Tuberculin		
Time of Injection	48th hr.	96th hr.	Time of Injection	48th hr.	96th hr.
8	14	11	8	14	12

Cow No. 2.—Had been tested with both the comparative and American methods and was showing the reactions at the 96th hour, the readings being :—

Avian Tuberculin			Mammalian Tuberculin		
Time of Injection	48th hr.	96th hr.	Time of Injection	48th hr.	96th hr.
8	9	12	8	14	14

The caudal fold was thickened and showing a positive reaction, and tumefaction was well marked in the left lip of the vulva (also showing a positive reaction).

Cow No. 3.—Had been tested with both the comparative and American methods, the inoculations having been done 96 hours previous to the demonstration. This cow was completely negative in all sites.

Cow No. 4.—Had been inoculated in the caudal fold and vulva (American method) and was showing the reactions at the 48th hour, the caudal fold being thickened and tumefaction present in the left lip of the vulva, *i.e.*, a positive reaction in both sites.

Cow No. 5.—Had also been inoculated in the caudal fold and vulva 48 hours previous to the demonstration. There was marked swelling of the left lip of the vulva showing a very positive reaction whereas the caudal fold was not thickened and showed a negative reaction.

In introducing his subject Mr. Murphy made the following remarks :—

Ever since Koch produced tuberculin over 50 years ago in his vain attempts to use the endotoxin of the tubercle bacillus as an agent for treating tuberculosis, many investigations have been made to obtain the toxin in its pure state free from extraneous proteins used in its preparation, for diagnostic purposes.

As you are aware, these extraneous animal proteins have been responsible for the non-specific protein reactions indicated by swellings, in the intradermal test in tubercle-free cattle that happened to be allergic to these proteins, with the result that faith in the old broth tuberculin has been largely lost as far as the skin test is concerned.

By using a vegetable derivative, asparagin, in suitably standardised saline solutions as a culture medium in recent years, the so-called synthetic tuberculin came into use, but from evidence available it appears that swellings continue to occur in many cases where no lesions of tuberculosis have been seen at *post-mortem* examination. This fact has come to light in so many cases that it became evident that the sensitivity of these animals to tuberculin was due to some other cause than that they were affected with bovine tuberculosis.

Tuberculin produces a reaction in an animal because of the sensitivity of the animal to this product, but it would appear that this sensitivity is a group allergy and is due to the animal being infected with one of the organisms of the acid-fast group such as the avian tubercle bacillus, the bacillus of Johne's disease and the acid-fast organism causing nodular swellings along the lymphatics in the legs of cattle, the so-called pseudo-tuberculosis. It would appear that the chief of these organisms causing the reactions is the avian tubercle bacillus.

Consequently, it has become the practice in England and in Northern Ireland quite recently to employ both avian and mammalian synthetic tuberculins simultaneously in what is now known as the comparative test. Experiments are still in progress to obtain a purer tuberculin still, by precipitating the proteins in the culture media and the preparation known as P.P.D. tuberculin has now come into being.

When the Ministry of Agriculture and Fisheries in Great Britain decided to undertake the preparation of tuberculin for use in connection with the Tuberculosis (Attested Herds) Scheme, the tuberculin prepared by the Bureau of Animal Industry, Washington, was selected as the type to be used.

When this tuberculin came into use for retesting attested herds, in which the incidence of bovine tuberculosis was very low, the increase in the number of positive reactions as compared with previous experience was much greater, the percentage of herds showing reactions being doubled, and the percentage of reacting cattle being quadrupled. *Post-mortem* examination of reacting animals from these herds failed in a high proportion of cases to show infection with the bovine tubercle bacillus, and it became evident that the sensitivity of these animals to tuberculin was due to some other cause, such as infection with some other type of acid-fast organism, particularly the avian tubercle bacillus.

Faced with this problem, the Ministry asked the Agricultural Research Council to investigate the whole question of the tuberculin test. At the same time, it was essential to find some immediate, even if only temporary, means of meeting the situation. The Ministry, therefore, adopted the only practicable means available by introducing a comparative test, with all its attendant difficulties, using mammalian and avian tuberculins as had been done in other countries. This test consists of the simultaneous injection of the two tuberculins, when a comparison of the resulting reactions makes it possible to distinguish between those reactions due to infection with the bovine bacillus and those due to other infections. So was born the comparative tuberculin test.

Amongst the preliminary findings of the Agricultural Research Council we find the recommendation "That a change to P.P.D. as soon as possible is considered desirable on the general ground that a purified or partially purified product containing 'the active principle' is to be preferred to a product of less certain composition."

The animals used for demonstration purposes to-day have been tested with P.P.D. avian and P.P.D. mammalian tuberculins.

. . . . . .

Mr. Murphy then demonstrated the official method used by the Northern Ireland Ministry of carrying out and interpreting the comparative test, which is as follows :—

Intradermal Tuberculin Tests

Official Method : Ministry of Agriculture for Northern Ireland

1. The comparative test, using both avian and mammalian P.P.D. tuberculins, will, in future, be used on all self-contained Grade A herds and for all retests.
2. The single intradermal test only will be used.
3. *Site.*—The middle third of the side of the neck will be used and the two tuberculins will be injected at points roughly equidistant from the point of the shoulder. The skin should be "loose" at both sites. The top injection should be made about 4 inches from the crest. The same side of the neck can be used for both injections, and these can be made diagonally about 6 inches apart. To avoid confusion always put the avian in front and inject it first.
4. The dose of each tuberculin is 0·1 c.c. injected into the thickness of the skin.
5. The skin must be measured carefully on each site prior to injection and the results noted and measured carefully at the 48th and 96th hours.
6. An increase in the thickness of the skin of 2 mm. is permitted provided there is no diffusion. An increase of 3 mm. is doubtful, and increase of 4 mm. is regarded as positive.
7. Animals infected with bovine tuberculosis usually show greater increases than those and increases of 4 and 5 mm. are often due to non-specific infection.
8. The simultaneous use of the avian tuberculin test is designed to eliminate these non-specific reactions. In a herd if a number of animals are found to give reactions to avian tuberculin and not to mammalian, or very marked reactions to avian and comparatively small reactions to mammalian—then one has evidence of

* Given at the meeting of the Veterinary Medical Association of Ireland held in Dublin, May 10th, 1944.

a non-specific infection in the herd and the following system of interpretation is used :—

(*a*) Animals which show positive or doubtful reactions to both tuberculins and in which the mammalian reaction is not greater than the avian by more than 4 mm. should be regarded as infected with a non-specific infection, and left in the herd.

(*b*) Where the excess to mammalian tuberculin is between 4 and 6 mm. the result should be regarded as inconclusive and the animal should be retested.

(*c*) Where the excess in the reaction to mammalian tuberculin is more than 6 mm. the animal should normally be regarded as infected with bovine tuberculosis.

N.B.—Where clear-cut reactions to mammalian tuberculin are met with in a herd in addition to these non-specific reactions it should always be borne in mind that an animal may be infected with both bovine and avian tuberculosis. An animal showing very large reactions to both tuberculins is probably infected with bovine tuberculosis. Such an animal if held for retest should be isolated and kept housed and the retest carried out in about six weeks. At the retest the avian reaction will usually be found to have diminished and no trouble will be experienced in deciding that the animal is infected with bovine tuberculosis.

9. In a self-contained herd where no reactors have been met with for several years, the occurrence of a reactor to the mammalian tuberculin with a negative avian reaction should be regarded with suspicion. Such an animal should be inspected again at the 120th hour and unless the reaction is large and definite, the animal should be isolated and retested in six weeks. (It is known that very often the reaction to avian tuberculin is delayed, especially in animals tested with avian for the first time.)

10. In herds where *no* evidence of non-specific infection has been found, animals which show a positive reaction to both tuberculins, should be *retested* only if the reaction to the mammalian tuberculin does not exceed the avian by more than 4 mm. If the mammalian reaction is greater than the avian in these cases by more than 4 mm. the animal must be regarded as infected with bovine tuberculosis and no retest is necessary.

If, however, an animal should give a doubtful reaction to mammalian tuberculin and a negative reaction to avian, such an animal would be held for retest.

11. Retests should be conducted between six and nine weeks after the inconclusive or doubtful tests.

12. It should be noted that sites where tuberculin tests have been previously carried out may be temporarily desensitised. Where retests have to be carried out sooner than after a 60 days' interval, the other side of the neck should be used.

13. When comparing the results for avian and mammalian tuberculin, the comparison is of the greatest reaction in each, irrespective of which hour of reading this occurs. Thus, if the avian gives the largest reaction at the 48th hour and mammalian at the 96th hour, then these two readings are compared.

14. Preconceived ideas regarding pain and the necessity or otherwise for measurements should be discarded.

N.B.—The comparative test will not be used on new cows, in Flying Herds, or in herds being tested for the first time.

. . . . .

The Comparative Test

The demonstrator then made the following remarks on the comparative test.

In carrying out the comparative test great care must be taken to ensure that there is no mixing up of syringes or tuberculins. Great care also should be exercised in taking measurements. The siting, too, is very important.

A lesser reaction to tuberculin if injected near the shoulder will be obtained than if injected in the middle of the neck. The sitings should be far enough apart to ensure that if a large reaction results in either or both sites, one reaction will not interfere with the other.

Some recommend clipping a fairly large area of the skin so that the plaque-like reaction is not missed by being lost in the long hairs around the injection site.

Various types of syringes and calipers will undoubtedly be used by different practitioners. The practitioner will, no doubt, get the best results from the equipment with which he is familiar. The main thing is that his equipment should be in first-class working order and able to carry out very efficiently what is required of it. The needles should be fine and sharp, and the syringe should be of such a nature as to ensure that the proper dose of tuberculin is put into the skin. No doubt, in time, some ingenious person will invent calipers that will be fool-proof as regards measurements. It is important that measurements be very accurate and that the same calipers should, in the hands of different operators, record the same measurement of the same swelling at the same time.

In the interpretation of the comparative test, the term "doubtful" is used to describe the reaction to an injection of tuberculin which is neither positive nor negative. The term "inconclusive" is used to describe the result of a comparative test where the reactions, history, etc., have not enabled a definite opinion to be formed as to the type of infection causing the reactions.

It appears to me, from having studied the methods of interpretation of the comparative test, that avian tuberculosis in bovines is considered to be of no great consequence. I wonder very much whether this is so. It is well known that avian tuberculosis causes generalised tuberculosis in the pig. I wonder whether a sufficient number of lesions of tuberculosis from bovines has been typed to prove that the avian bacillus is non-pathogenic in the bovine. I have heard of a case of tuberculosis of the udder in a cow in this country which proved to be a case of avian infection.

I respectfully suggest to our State Veterinary Department that it is imperative that serious immediate investigation be made into this problem and that experimental tuberculin testing on a very large scale, checked by *post-mortem* examination, be carried out so that the problem of eradication of tuberculosis from our herds may be undertaken with the utmost confidence.

THE AMERICAN METHOD

Mr. Murphy then demonstrated the American method of tuberculin testing as outlined in the paper by H. M. O'Rear* and also explained the interpretation of this test as given in the paper, which was as follows :—

Technique in the Application of the Intradermic Tuberculin Test

It is a rather difficult task to particularise in a paper of this kind without conveying an impression of over-emphasising minor details. However, the phenomenon of an intracutaneous tuberculin reaction is a delicate and intricate process : consequently, a technical discussion of the subject naturally necessitates the constant association of certain recognised fundamental principles with the intricacies involved. For it is quite true, when certain principles are disregarded in the application of the test, complications often result that tend to confuse the operator in rendering an accurate decision which may not alone be accompanied with embarrassment, but may also jeopardise a prestige that may have otherwise been avoided by a more careful consideration of details.

Naturally, the first point for consideration in reckoning with the use of any test is a frank and unbiased recognition of its limitations. No one contends that the intradermic test is by any means infallible, especially when viewed at time in individual instances, but viewed collectively, considering the varied conditions encountered in applying more than 13,000,000 tests annually throughout the United States, the gross results obtained are certainly comparable with any other test extensively used in medicine. There is, perhaps, no other test of which so much has been demanded as the intradermic test. Unreasonable demands should not be made, nor should its misappropriation be by any means considered an inaccuracy. In the hands of a careful, skilled veterinary technician the tuberculin test is by far the best scientific means of the present age in detecting the presence of tuberculosis in the living animal.

Prior to official recognition of the intradermic method of testing, few veterinarians in this country had had but a limited experience in the usage of this test. As a result, when adopted for official use, each operator busily interested himself in developing a broader scientific knowledge in the application of this practically new method. Concentration of effort in an endeavour to attain the highest point of efficiency and accuracy possible afforded many suggestions in the application of the test, which led also to certain laboratory changes in the tuberculin product itself.

It is hoped that any thought associating the operative technique in applying the intradermic test with a mere haphazard procedure of injecting tuberculin and looking for "knots" as evidence of a positive reaction has long since been dispensed with, in the event such an impression may have existed.

The double injection here refers to two injections, one in caudal fold and the other into vulva; American dose is 0·05 c.c.

The double injection method of applying the intradermic test has not alone proved to be an extremely valuable asset to the writer but has also met with the satisfactory approval of many others, and is now popularly used in practically all sections of the country.

The initial step in preparation of conducting a tuberculin test, of course, like any other professional or scientific undertaking, requires the assembling of adequate equipment, which should be of the proper style and sufficient completeness to meet the necessary needs and reflect all the professional dignity prevailing conditions will permit. In other words, when launching upon an expedition of tuberculin testing the operator should appear sufficiently equipped to complete the task undertaken with proficiency and precision.

The next step, and one of paramount importance, is the proper restraint of the animal. It is impossible to over-emphasise this particular point, and in no instance should an operator modify the rule of absolute restraint in its most exacting sense merely to satisfy some wish of an owner or his agent, who is not familiar with the basic principles involved in a delicate test requiring a rigid observance of technique to accomplish the desired objective, and who, naturally, is unqualified and in many instances unable to understand or appreciate the relative importance of restraint as an influencing factor in the accuracy of the ultimate results.

There are in general use two practical methods of restraining the animal, one being the tightly arranged chute, constructed especially for this particular purpose, and the other a bull lead placed in the nose and held by an attendant. Should the latter procedure be decided upon, the attendant should exercise sufficient strength in a certain prescribed manner that will completely anaesthetise the

* Read by H. M. O'Rear, Veterinarian, Tuberculosis Eradication Division, Bureau of Animal Industry, United States Department of Agriculture, at the New Jersey State Veterinary Association, Jersey City, N.J., January 13th and 14th, 1932.

animal with respect to its consciousness of the presence of the operator, affording ample opportunity to enable the operator to make a proper injection at the desired point without resistance from the animal.

The next step may seem to many to be far fetched and probably over-drawn. However, it is the firm belief of the writer that a demonstration of this particular question will prove conclusively the contention that the standing position of the operator is essentially an important factor in the attainment of a proper uniform injection. Taking into consideration many natural handicaps met with in the field, and assuming the operator to be right-handed, he should stand in a position conforming to a proper angle with the location of the operative field, which should be slightly to the left side of the animal.

After properly preparing the field, the left hand is placed under the tail near its base, palm up, with the side of the thumb resting against the left side of the tail, and the tips of the second and third fingers extending partially around the right side of the tail. In this manner the tail may be firmly held, preventing the animal from switching it. Then the forefinger is brought into contact with the skin covering the ventral surface of the second or third coccygeal vertebra on its central line. By exercising care to prevent the finger from slipping on the surface of the skin while pushing slightly forward and to the right side, the inner surface of the subcaudal fold will become exposed with sufficient tension to permit the needle to be easily inserted. Then by grasping the syringe in the right hand, avoiding muscular tension and allowing perfect freedom of the arm, with the fourth and fifth fingers of the right hand in slight contact with the free fingers of the left hand, the operator is in a position to move in any direction in the event of the animal moving unexpectedly, without causing any mechanical injury to the tissues.

The needle, exposed approximately one-half of an inch, with the bevelled edge turned outward next to the epidermis, may be inserted full length, exercising precaution to follow the grain of the tissue and guided superficially enough to permit the operator to see the opening of the needle beneath the epidermis. Approximately one-half of a minim or one-twentieth to one-thirtieth of one c.c. of tuberculin is injected on the surface of the hypodermis, care being taken to avoid breaking down or damaging the tissue by using unnecessary force.

The first injection completed, by stepping a trifle to the right the left lip of the vulva is grasped gently between the thumb and forefinger of the left hand, applying just sufficient strength in a downward motion to tense the tissue. Then, by lowering the wrist of the right hand holding the syringe, a similar superficial injection of a like amount of the tuberculin is made with the same precision, perpendicularly on the line of demarcation between the vulvular tissue and mucous membrane, exactly half-way between the upper and lower commissures.

The use of a small dose of tuberculin as recommended is quite capable of exciting the same response in a tuberculous animal possessed of any ability to react that might be expected of a greater or excessive amount of tuberculin. The small dose of tuberculin is of paramount importance in the non-tuberculous animal. Carefully injected, a small amount of tuberculin is readily absorbed, thus preventing a prolonged capillary congestion caused by mechanical injury or the distortion of tissues as a result of an excessive dose of tuberculin which, in turn, will tend to minimise post injection troubles generally associated with needle traumatism.

In following this line of procedure the intradermic test may be referred to as possessing five cardinal points of virtue with reference to a true response to tuberculin, indicating a positive reaction, namely :—

1. A tumefaction or induration of the caudal tissues.
2. Enlargement of the caudal lymphatic chain.
3. A tumefaction or induration of vulvular tissue.
4. A typical characteristic discoloration of the vulvular mucous membrane.
5. Involvement of the vulvular lymphatic chain.

Characteristic disturbances, typical of a true response to tuberculin at any of the points referred to above, whether they appear singularly or collectively, should be regarded as a positive evidence of a reaction.

Those who have had considerable field experience in the actual application of the tuberculin test will readily recall the many instances encountered when the structure of the subcaudal fold seemed to be apparently less sensitive, harsh, flabby, and leather-like. You will recall also the difficulty of sometime obtaining satisfactory reactions in this particular type of tissue, and then, at a later date, find the animal to be tuberculous upon slaughter. Then, in direct contrast, compare the more sensitive, more vascular and more uniform structure of the vulva. Is it not fair to expect, under prevailing conditions of this nature, possibilities meriting a lower injection, when enhanced by three additional points of advantage in arriving at a definite conclusion.

Again, in recognition of the fact that it is occasionally difficult to excite a reaction in an animal affected with obstinate long standing generalised tuberculosis, would it not be reasonable to conclude that in a body laden with tuberculosis, there existed possibilities significant of the inability of sufficient attraction to stimulate the process of reaction to the extent of producing a tumefaction or induration of the tissue at the point of injection ? Yet, could it not be possible in some instances to produce sufficient attraction for the lysin in the animal body to create lymphocytic mononucleosis in the lymphatic chain adjacent to the injected tissues that may be recognised as a typical response, characteristic of a tuberculin reaction ?

Rapid strides have been made in the use of the intradermic method of tuberculin testing, but it is quite possible there yet remains some unobserved feature that, if properly interpreted, would materially increase the value of the intradermic test as a diagnostic agent.

There are a number of experiments in progress at the present time dealing with sensitisation and other allied acid-fast bacteria, that will, probably, prove to be of beneficial importance to tuberculosis eradication in many sections within the near future. However, the writer has implicit faith in acclaiming the double injection method a contributing factor in accuracy superior to the single method alone, and until augmented by the enlightenment of further research feels no hesitancy whatever in recommending its use, when accorded sufficient study completely to familiarise the operator with a thorough understanding regarding its proper use.

With the constant changes taking place as the incidence of bovine tuberculosis is being reduced, we must ever be alert to avoid preventive criticism.

. . . . . .

In conclusion, Mr. Murphy informed the members that he was at present conducting an experiment on tuberculin testing which he hoped to carry out on 50 cows.

His experiment consisted in the use of the comparative and American methods of tuberculin testing on the same animal at the same time.

The tuberculin used was Weybridge P.P.D. tuberculin and the dose used in each case was 0·1 c.c. There was only a single inoculation and the readings were taken at the 48th hour and the 96th hour and the cows were then slaughtered at the 96th hour and a detailed *post-mortem* examination carried out.

Mr. Murphy handed round the results of his experiment in so far as he had gone at the time of the demonstration. The members present were particularly interested in his findings.

The President then proposed a very hearty vote of thanks to the demonstrator for the trouble to which he had gone in arranging the demonstration and for the very useful information he was obtaining in carrying out his experiment.

[Note.—When Mr. J. M. Murphy has completed his experiment on the 50 cows, the results will be sent to *The Veterinary Record* for publication.]

ADSORPTION OF ACRIDINES BY GAUZE

The use of acridine chemotherapeutic agents in the prophylactic and curative treatment of wounds often entails their application in conjunction with gauze. When a solution of the acridine compound is used, the gauze adsorbs a certain amount of the dye. The quantitative adsorption of these compounds has been determined by Albert and Gledhill and the preliminary note already published (*Pharm. J.*, 1944, i, 55) has now been expanded (*Lancet*, 1944, **246**, 759). Gauze adsorbed about 33 per cent. of proflavine sulphate B.P. from a 0·1 per cent. solution in water, but this figure was raised to 68 per cent. if the solution was made up in normal saline instead of water. Agitation with water removed large quantities of the dye and running water removed in five minutes nearly all of it.

That the foreign matter present in the gauze played a part in this adsorption was shown by the fact that a sample of gauze freed from it by the B.P.C. method adsorbed only half the quantity of proflavine. Adjusting the solution of proflavine to *p*H 6 by the addition of a quarter of its weight of sodium bicarbonate increased the adsorption from 33 per cent. to 61 per cent. The adsorption of other acridines varied considerably, 5-amino-acridine (23 per cent.) and acriflavine (22 per cent.) being the least adsorbed. When the acridine-soaked dressings were in contact with serum a much higher degree of adsorption occurred than with water. Such dressings may therefore be regarded as depots capable of supplying these substances to wounds with which they come into contact. This is in harmony with the bacteriological findings of Savage (*Pharm. J.*, 1943, ii, 53), who showed that proflavine gauze is very effective in killing streptococci *in vitro*. For an immediate and complete concentration in the wound, non-absorbent dressings are still recommended.—*Pharm. J.*

CLINICAL COMMUNICATION

Fracture of the Zygomatic Process of the Malar Bone in the Dog*

J. B. HARMAR, M.R.C.V.S.
Berwick-on-Tweed

The dog, a terrier collie cross two years old, was presented with an abscess on the left cheek, extending from the eye to the ear. Temperature 103° F.; inappetence; no interference with mastication of soft food, but ate dry biscuit with difficulty. History of a dog fight one week previously.

The abscess was incised at its lower border and the pus evacuated. The masseter was eroded, but no other abnormality detected.

When the dog was presented two days later, the temperature was normal but there was still difficulty in chewing hard food. The wound was discharging and a piece of the zygoma could be felt displaced downwards; crepitation present.

The dog was given one grain morphine subcutaneously. The area of the abscess was blocked with a 2 per cent. procaine solution and 3 c.c. of a 5 per cent. procaine solution instilled into the wound. The original incision was enlarged to 2½ inches and a transverse incision made across this, one inch in length. The bone was gripped in tooth forceps and dissected out; it proved to be the zygomatic process of the malar. It was adherent at its posterior end to the temporal bone. The edges of the fractured bone and the malar temporal junction were curetted and several fragments of bone removed. The cavity was swabbed out, packed with sulphanilamide powder, and sutured.

The stitches were removed five days later. The wound had healed for the greater part of its length, and the cavity was granulating well. There was no interference with mastication and no salivation. No abnormality was visible in profile.

* Case report communicated to the meeting of the North of England Division, N.V.M.A., at Newcastle-upon-Tyne, August 11th, 1944.

RE-PASTEURISED MILK

Some plants supplying milk to Army stations have accepted milk for pasteurisation that had been heat-treated to lower its bacteria count and prevent souring. This practice results in the re-pasteurisation of milk. The Army specifications for fresh milk do not provide for the acceptance of such milk. To permit re-pasteurisation would encourage the use of old milk and milk with a high bacterial content thereby increasing the possibility of gastric disturbances due to bacterial toxins. Few receiving stations are equipped properly pasteurise milk. To determine the conditions under which the milk was pasteurised and the quality of the milk received for pasteurisation would necessitate an increase in inspection work. Furthermore, pasteurised milk is subject to contamination and the phosphatase test, a valuable check on the efficacy of the pasteurisation of milk, would be of no value in determining effective re-pasteurisation.

Lactic acid bacteria in milk retard or prevent the growth of proteolytic organisms. Pasteurisation destroys a large percentage of the acid-forming bacteria and thereby delays souring. The destruction of these bacteria, however, permits a more rapid growth of the proteolytic organisms which may be present in the milk. Proteolytic organisms cause decomposition of the milk which is a more serious defect than souring and not as readily detected. Re-pasteurised milk should not be accepted by Army installations.—*U.S. Army Medical Department Bulletin.*

* * * * *

Weekly Wisdom

That the milk of diseased cows suffering from tuberculosis . . . is likely to induce phthisis, we are only now commencing to obtain proofs. . . . The infection of milk should be no less the function of the sanitary veterinary surgeon than that of the flesh. Its healthy condition is a matter of great importance, as it enters more or less largely into the diet of every person, and is almost the sole food of infants.—George Fleming, 1875, Veterinary Sanitary Service and Police.

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Speaking at an autumn demonstration at East Horden (Essex) recently Mr. J. A. Scott Watson, Chief Advisory Officer of the Ministry of Agriculture, said there will have to be a change over in agriculture and farmers will have to grow less potatoes and straw crops, and more livestock, but poultry keepers and possibly pig keepers would have to wait a little longer for the day when they could pick up the telephone and order feeding-stuffs.

ABSTRACTS

[Undulant Fever Caused by *Brucella abortus* Strain 19. Gilman, H. L. (1944.) *Cornell Vet.* **34**. 193-194.]

A student at the New York State Veterinary College accidentally sprayed a few drops of vaccine in his right eye when injecting a calf with *Brucella abortus* strain 19. The eye was washed out at once and nothing more was thought of the incident until 16 days later when the student developed a severe headache and an undulating fever. The original diagnosis on admission to hospital was "influenza." The symptoms were severe headache, abdominal pain and "chills." Seven days after the first symptoms the diagnosis was changed to probable undulant fever (temperature varied from 99° to 103° F.). Blood culture on the seventh and ninth day yielded *Brucella abortus*: cultures made late on the tenth day were negative. Sulphadiazine therapy resulted in marked improvement after four days and the patient was discharged after three weeks in hospital. Recovery was complete four weeks later.

The agglutination titre of the patient's blood rose from 1:100 on the fifth day of illness to 1:51,200 on the 25th day. No further agglutination tests were made.

The strain of Brucella which was isolated is considered to have been strain 19—it grew readily under ordinary aerobic conditions, it produced only mild lesions in guinea-pigs and an agglutination titre of 1:200, and when cultivated by the dye plate method of Huddleson it grew only on the basic fuchsin media. The history of accidental instillation of the organism into the eye 16 days before the first symptoms provides additional evidence in support of the view that strain 19 was responsible.

This report suggests that strain 19 is capable under certain conditions of infecting man. It is therefore advisable to use reasonable care in handling the vaccine.

E. G. W.

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[The Practical Application of Anthelmintic Medication of Lambs. Britton, J. W., and Miller, R. F. (1944.) *J. Amer. vet. med. Ass.* **104**. 270-272.]

Britton and Miller record the results of experiments designed to compare the effectiveness of three commonly used anthelmintics in the control of parasitism of lambs on irrigated Ladino clover pastures. All the experimental lambs came from one flock, were raised alike and had been on a 1:15 phenothiazine and salt mixture from birth till the start of the experiment. They were divided into eight groups as follows: group 1, controls, no treatment; group 2 received 3 oz. "cunic" (*i.e.*, copper-sulphate nicotine-sulphate) mixture; group 3 received 5 c.c. tetrachlorethylene; group 4 received 8 gm. phenothiazine powder in hard gelatine capsule; group 5 received 15 gm. phenothiazine as a drench; group 6 received 13·5 gm. phenothiazine pellet; groups 7 and 8 had continual access to a 1:15 and a 1:10 mixture of phenothiazine and ground salt respectively. Groups 2 to 6 inclusive received a second treatment after 33 days. The results were assessed on the basis of faecal egg counts, live weight gains, percentage of fat lambs and death loss in the various groups. The authors conclude that, taking all factors into consideration, phenothiazine is significantly superior to the other anthelmintics used and more particularly so when administered as a 1:10 phenothiazine salt mixture to which free access is given. Then, it most nearly approaches the ideal anthelmintic in being non-toxic, easy to administer, cheap and effective. (It is perhaps unfortunate that no group of lambs receiving salt alone was used in this experiment.)

W. T. R.

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[Treatment of Anoestrus of Sows with Diethylstilboestrol. Barker, C. A. V. (1944.) *Canad. J. comp. Med.* **8**. 11-13.]

Three cases are reported in which a dose of 10 mgm. diethylstilboestrol dipropionate given subcutaneously was apparently successful in inducing oestrus in sows in from three to seven days; the induced oestrus was followed by normal recurring cycles. The author gives in tabular form a summary of previous case reports in the literature on the use of stilboestrol for anoestrum in sows (*e.g.*, Pierse. *Vet. Rec.* **55**. 389), from which he formulates the following suggestions: (*a*) Ovulation is induced in a certain percentage of anoestrous sows by treatment with stilboestrol; (*b*) a dose of 5 mgm. may be sufficient to remove the anoestrum in sows that have farrowed one or more litters, but anoestrous gilts may require 10 mgm.; (*c*) oestrus may be expected to appear in from one to seven days following treatment; (*d*) the duration of the induced oestrus appears to be variable; (*e*) a normal interval of 21 to 23 days will elapse between the induced oestrus and the first normal oestrus, although in gilts this period may be shorter. Further studies are required to confirm these views.

N. J. S.

Questions and Answers

"Questions and Answers" will be published on alternate weeks.

The submission of questions for inclusion in this column will be welcomed. They can relate to any aspect of veterinary work and where publication of the name of the enquirer is not desired, a pseudonym should be supplied, the name and address also being given.

Answers to readers' queries represent exclusively the personal opinions of the writers, and criticism of the replies will be appreciated.

All communications should be addressed to the Editor.

Bacteriological Diagnosis of Anthrax

Q.—*Does the characteristic purple colour always appear in blood smears, from cattle, stained with methylene blue? What proportion of cases in* cattle *which are ultimately confirmed by the Ministry has to be cultured before a diagnosis can be given, and what are the atypical features of the bacilli involved?—"Mike."*

A.—In reply to the first part of the question, yes, if the carcase is not too decomposed and the blood not putrid. The slide must be properly prepared by making a thin even smear of blood from a distal blood vessel, preferably from the ear or tail, drying the smear in air, then fixing by heat. When cool, stain for one minute with an old 1 per cent. aqueous methylene blue solution, wash with water, dry, and invariably the purple colour will be seen if the blood contains anthrax bacilli. The reaction depends on the disintegration of the capsules by heat and will not be seen with putrid blood. A somewhat similar purple reaction may be seen with non-anthrax smears prepared in the above manner.

With reference to the second part of the question, in the writer's experience the number of positive cases which have to be submitted to biological, precipitin or cultural tests for diagnosis, provided a good slide has been sent, is extremely small and atypical anthrax bacilli do not exist.

Feline Infectious Enteritis

Q.—*Can you recommend a satisfactory prophylactic and treatment for feline infectious enteritis?—W. H. Lambert.*

A.—At the very outset strict measures of isolation and disinfection must be at once adopted owing to the intensely infectious nature of the disease—a feature which convinces one from the start that it has a virus causation. Professor Dalling, who had devoted much study and thought to feline enteritis, made the public statement in 1935 that he had succeeded in immunising cats against this disease, but not against distemper. He prepared a prophylactic vaccine with which an immunity lasting two or three weeks was conferred. Soon after, it was possible to obtain from the Wellcome Laboratories a specific anti-serum which was very effective. It went out of production during the war, but hopes are entertained that it may afterwards be again procurable. The writer cannot support the view that coli serum is of any value in this specific condition. He has experimented with the use of human scarlatina serum, as there is a growing conviction in some minds that streptococcus is involved, at least as a secondary invader. Efforts to cure cats with this serum have failed. It was thought at first that penicillin might prove to be a specific, but we are warned in advance by no less an authority than Dr. Fleming himself, that the typhoid, paratyphoid, dysentery and coli group of organisms are entirely insensitive to it. Neither penicillin nor the later preparation—vivicillin—appears to have any action against the viruses, but vivicillin is said to act against the coli group. The writer has failed to secure any results from its use in infectious feline enteritis. Claims have been made for the value of sulphanilamide, but the writer, after trial, has not been able to endorse that view, so far as correctly diagnosed cases are concerned. He feels hopeful, however, that, after further extended trial, sulphaguanidine might confer some benefit.

Therapeutic measures seem hopeless, quite 95 per cent. of affected cats dying—probably within 48 hours. The two outstanding symptoms—emesis and pain—are so urgent that no time should be lost in applying counter measures as, if not relieved, the early prostration soon becomes a collapse. In any case, collapse and death are the termination in most cases whatever one may do. Benzocain and/or nembutal are useful agents against these two symptoms, the former being enclosed in capsule to prevent anaesthetising the buccal mucous membrane. A method of treatment which stimulates reaction in the tissues, and which can be at once applied without waiting to obtain commercial products, is the intramuscular daily injection of 1 c.c. freshly boiled milk. Among the non-specific vaccines one has a fairly wide choice; but frankly, poor results have followed their use in this rapidly fatal disease. Chloretone, morphine and salol are contra-indicated for cats.

Head (Notoedric) Mange in the Cat

Q.—*Can you suggest an effective treatment for head (notoedric) mange in the cat?—J. Fulton, M.R.C.V.S.*

A.—Generally, cure of this condition is a simple matter. The notoedres do not burrow deeply as do sarcoptes; thus, being more exposed, they are more readily exterminated. In many cases a simple inunction of sulphur ointment is sufficient, this being applied (after clipping) for four or five days. "Odylen" or "Novidol" smeared over the head are also successful. Benzyl benzoate emulsion, whilst very effective against mange parasites, has been reported by several practitioners as dangerous to cats. Whether this danger results from absorption or from licking has not been made clear. A safer dressing and one which is clean, rapid, and thoroughly good, is "Sarcogen" (Hewlett). Ol. picis should be avoided, as although it is unlikely to prove toxic from absorption when only the head is dressed, it would probably become ingested owing to a cat's habit of rubbing its head with its paws and then licking the latter.

Pseudo-pregnancy in the Bitch

Q.—*What are the hormone influences governing the development of the so-called false lactation in the non-pregnant bitch, and its rational treatment?—Mick.*

A.—False lactation, or pseudo-pregnancy, is a normal occurrence in a bitch, though some individuals show it much more markedly than others. The corpora lutea which develop subsequently to ovulation persist for about the normal length of gestation and the progesterone thus produced stimulates the growth of the mammary gland which has previously been sensitised by oestrone. Towards the end of this period, prolactin, produced by the anterior pituitary, initiates actual milk secretion.

Large doses of oestrogen have been used successfully to inhibit lactation in humans following stillbirth and, although the endocrine system of the human and the bitch are by no means identical, a logical treatment would be the oral administration of daily doses of 1 mg. of stilboestrol dipropionate to suppress the activity of the anterior pituitary.

General measures to reduce milk secretion should also be adopted, such as the use of a laxative to increase the output of fluid in the faeces, sedatives to lower metabolic rate, and not milking out the mammary gland, unless this becomes too painful.

Income Tax Query: Car Depreciation Allowance

Q.—*Owing to the impossibility of buying a new car and difficulties experienced in hiring, whilst my present car is under repair, I have found it necessary to have two vehicles. Am I entitled to 20 per cent. allowance for depreciation on both cars?—"Runabout."*

A.—This should be referred to the inspector who deals with the income tax affairs of the member in question, giving him the full facts, or discussed with his accountant.

QUESTIONS IN PARLIAMENT

Agriculture: War Executive Committees (Land and Machinery, Post-War)

Mr. Gallacher asked the Minister of Agriculture what plans have been made for dealing, after the war, with the land now farmed by war agricultural executive committees and with the agricultural machinery now controlled by these committees.

Mr. Hudson: These matters are under consideration. As regards land, I would refer the hon. Member to my statement on the Second Reading of the Agriculture (Miscellaneous Provisions) Bill on October 9th, 1941. As regards agricultural machinery in the hands of committees, while it cannot yet be foreseen how long the present arrangements will continue any supplies that become available will be disposed of in accordance with the general principles and procedure set out in the White Paper on Government Surplus Stores (Cmd. 6539) published in July last.

Smuggled Service Pets

Sir R. Gower asked the Minister of Agriculture whether, in view of the danger of an outbreak of rabies here resulting from attempts by members of the British and Allied Forces to smuggle dogs and cats into this country, he will co-operate with the R.S.P.C.A. in a Press campaign on this subject both in British papers and papers circulating amongst the Allied Forces.

Mr. Hudson: The need for preventing the smuggling of dogs and cats into Great Britain has already been the subject of discussions with the Service Departments and the Chief of the Veterinary Division of the U.S. Forces in Europe, and steps have

(*Concluded at foot of col.* 1, *page* 404)

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Oct. 24th and 25th.—Meetings of the British Society of Animal Production and the Institute for the Study of Animal Behaviour, London School of Hygiene and Tropical Medicine, Gower Street, W.C.1, 10.30 a.m.

Oct. 25th.—Annual General Meeting of the Scottish Branch, N.V.M.A., at Glasgow (North British Station Hotel), 2.30 p.m.

Oct. 27th.—Meeting of the Southern Counties Division, N.V.M.A., at Salisbury (Red Lion Hotel), 2.30 p.m.

Oct. 27th.—Meeting of the Yorkshire Division, N.V.M.A., at Leeds (Hotel Metropole), 3 p.m.

Nov. 1st.—Meeting of the Scottish Metropolitan Division, N.V.M.A., at Edinburgh ("Dick" College), 2.30 p.m.

Nov. 2nd.—Meeting of Central Division, N.V.M.A., Conway Hall, W.C.1, 2 p.m.

Nov. 2nd.—Meeting of the Lancashire Division, N.V.M.A., at the University of Liverpool, 2.30 p.m.

Nov. 3rd.—Meeting of the Sussex Division, N.V.M.A., at the Old Ship Hotel, Brighton, 2.15 p.m.

Nov. 16th.—Meeting of the South-Eastern Division, N.V.M.A., at Tonbridge (Rugby Football Club), 2.30 p.m.

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PERSONAL

Appointments.—Mr. Joseph Edwards, M.Sc., formerly of the School of Agriculture, Cambridge, and at present with U.N.R.R.A., has been appointed by the Milk Marketing Board to be head of the new Dairy Husbandry Department. Mr. Edwards will take up duties as soon as convenient arrangements can be made. He will be responsible for the development of the department, and will take charge of artificial insemination centres to be operated by the Board and of the organisation of National Milk Records.

Appointments in the Colonial Service are announced of Mr. D. F. Macpherson, M.R.C.V.S., Veterinary Officer, as Senior Veterinary Officer, Kenya, and of Mr. K. W. Aspinall, M.R.C.V.S., as Veterinary Officer, Tanganyika Territory.

Junior Commander Betty Hart, elder daughter of Mr. Andrew Hart, M.R.C.V.S., The Anchorage, Ardnadam, has been appointed a staff Officer as Press Relations on Public Relations Officer for Southern Command. At the outbreak of war Junior Commander Betty Hart joined the F.A.N.Y.S. and was commissioned in this unit. In civil life she was a journalist and fashion artist. Her father served in the Boer War as a C.V.S. and in France during the last war as Captain, R.A.V.C.

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Brazilian Tribute to Mr. Miller Watson.—Mr. Miller Watson, M.R.C.V.S., of Glasgow, has been unanimously elected a Corresponding Member by the Brazilian Society of Veterinary Medicine. Following a long period of residence in Brazil, Mr. Miller Watson, who married a Brazilian lady, has kept in close touch with his veterinary friends on professional matters and literature; a retention of interest and association of which the members of the Society have thus shown their high appreciation. Some years ago the Brazilian Minister of Propaganda expressed his thanks to Mr. Miller Watson for the valued references to the country, made in contributions to "The Aryan Path" on the absence of the colour bar in Brazil.

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Marriage.—Clay—Monks.—On September 26th, 1944, at Grappenhall, Captain Hugh Adair Clay, R.A.V.C., only son of Mr. and Mrs. R. H. Clay, Knock, Belfast, to Joy, only daughter of Mr. and Mrs. A. J. Monks, "Dukefield," Appleton, Cheshire.

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recently been taken by the issue of an Army Council Instruction and Admiralty and Air Force Orders to remind all ranks that, except in accordance with the terms of licences issued by the proper authority, the bringing into Great Britain of dogs and cats from abroad is prohibited. Our American Allies have taken similar action to acquaint members of their Forces with the nature of the restrictions. Further publicity may be necessary in order to ensure that all members of the Forces overseas are made aware of the Regulations. That must, of course, be a matter mainly for arrangement with the Service Departments, but I shall be glad to bear in mind this offer of assistance from the R.S.P.C.A.

Royal Sanitary Institute Fellowship Elections.—Lieut.-Col. D. J. Anthony, M.R.C.V.S., D.V.S.M., Stourbridge, and Mr. F. H. Manley, M.V.Sc., M.R.C.V.S., have been honoured by being elected Fellows of the Royal Sanitary Institute.

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Veterinarian's Trinity College, Dublin, Award.—Mr. Lawrence Collery, M.R.C.V.S., Lecturer in Histology and Embryology, Royal Veterinary College of Ireland, has been awarded the Ph.D. by Trinity College, Dublin, for genetical studies published in the *Proceedings* of the Royal Irish Academy.

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R.C.V.S. OBITUARY

Greer, Frank Boyle (Capt., late R.A.V.C. (T.F.)), 31, Lynton Avenue, Bradford. Graduated London, July 24th, 1907. Died October 9th, 1944; aged 58 years.

Stevens, Horace Wardlaw, Major R.A.V.C. (T.A.) (retd.), 27, Bristol Road, Birmingham. Graduated Edinburgh, May 24th, 1905. Died October 11th, 1944.

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VETERINARY EDUCATION AT CAMBRIDGE: THE VICE-CHANCELLOR'S SPEECH

In his speech in the Senate House on October 2nd, the Vice-Chancellor of Cambridge University, Dr. T. S. Hele, made some important references to veterinary education at Cambridge. He said that a joint committee of representatives of the University and Addenbrooke's Hospital had already been set up to consider the relevant findings of the Goodenough Report on Medical Schools. As soon as the decisions taken with regard to the second Loveday Report on Veterinary Education were known, it was hoped to take the necessary steps to inaugurate veterinary teaching. Later in his speech the Vice-Chancellor referred to the important part which medical and veterinary activities could play in the future life of the University. "I see," said Dr. Hele, "the School of Clinical Research, and a Veterinary School, setting forth the practical applications of the academic work done in the University's scientific departments."

Dr. Hele dealt also with many other important aspects of the University's future. He said it was clear that the University would be invited to enter on new enterprises which if not properly handled might upset the normal balance of academic life and be catastrophic in their effects. There were many members of the University who were in fact, if not in theory, outside the collegiate system, and working without those financial and social advantages enjoyed by more fortunate colleagues. The University had outgrown the colleges, but at all costs the college system must be preserved. Extensions of existing colleges so as to include a much higher proportion of research Fellows or students would have the effect of upsetting the balance. Perhaps the idea of a Graduate College would be revived. He did not suggest that all research students should be segregated in the Graduate College, but many senior members of the University primarily engaged in research would welcome membership of such a college, and bring distinction to it. The new foundation would assist also in promoting that interchange between universities which was so desirable. He had always advised young Cambridge graduates after a period of research not to remain in Cambridge but to seek additional experience in wider spheres of usefulness.

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ROYAL SOCIETY OF MEDICINE BUILDING FUND

No. 1, Wimpole Street, W.1, the present House of the Royal Society of Medicine, which was built in 1910, is now inadequate for the modern needs of a Society whose fellowship roll has increased three-fold, and whose services to the science of medicine are ever developing in volume as well as in scope. Accordingly it has been decided to open a Building Fund to raise £50,000 in order to enlarge and equip the Society's House in a manner suitable to present and future requirements. Cheques, which should be made payable to the Royal Society of Medicine Building Fund, will be gratefully acknowledged by the Secretary of the Society at the address given.

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PALESTINIAN EPIDEMIC OF AFRICAN HORSE SICKNESS

In its issue of October 9th, *The Times* published the following intimation of the spread in Palestine of an epidemic of African horse sickness. The message from its Correspondent reads: "Though cases of African horse sickness were first diagnosed in Palestine only last month, already 773 horses have died and the epidemic has spread as far north as Acre. It is officially stated that if the northward trend is unchecked there is grave danger that the epidemic will reach Syria and eventually Europe by way of Turkey. Recoveries are rare, and the only remedy known is preventive, therefore the animals which contract the illness must be destroyed.

"An urgent appeal to two laboratories, in Kenya and South Africa, resulted in the receipt of 2,300 doses of vaccine immediately and 8,000 by the end of last month, and the promise of 3,500 weekly, but these are insufficient and conditions will probably worsen before the Veterinary Office gains the upper hand. It is impossible to prepare vaccines in Palestine during the present outbreak, as vaccination, which gives four to five years' immunity, takes three to four weeks to develop immunity. As the disease is carried by a night-flying midge, smoke fires on the windward side of stables and the draining of stagnant pools will help to check the spread of the sickness, but there is no absolute preventive. The vaccine is prepared from the brains of infected mice.

"The sickness has been known in Africa for more than 200 years, but was confined to certain areas until 1928 to 1931, when it first appeared in Upper Egypt. It was stamped out there, but reappeared in July, 1943, and spread to Lower Egypt. Up to now Egypt has lost 3,000 horses, mules and donkeys."

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SCHEME FOR THE CONTROL OF DISEASES OF DAIRY CATTLE

STATEMENT SHOWING THE NUMBER OF UNDERTAKINGS NOTIFIED TO THE MINISTRY OF AGRICULTURE DURING THE MONTH ENDED SEPTEMBER 30TH, 1944

County	Undertakings Notified: During Month	Undertakings Notified: Previously	Total Undertakings: Number	Total Undertakings: Number of Cattle: Cows	Total Undertakings: Number of Cattle: Heifers
ENGLAND					
Bedford	1	42	43	991	538
Berks	1	104	105	3,553	2,208
Bucks	2	94	96	3,197	1,780
Cambridge	—	14	14	344	208
Chester	3	406	409	13,412	4,576
Cornwall	—	4	4	72	75
Cumberland	—	65	65	1,618	1,411
Derby	2	327	329	9,433	5,378
Devon	2	278	280	4,191	2,496
Dorset	2	70	72	2,204	1,169
Durham	2	282	284	6,224	2,142
Essex	2	258	260	9,269	5,384
Gloucester	1	109	110	3,192	1,824
Hampshire	3	408	411	11,476	7,701
Hereford	—	25	25	359	231
Hertford	—	78	78	2,346	1,434
Hunts	—	13	13	475	302
Isle of Ely	—	3	3	83	75
Isle of Wight	—	14	14	252	127
Kent	1	155	156	3,972	2,300
Lancs	2	206	208	5,925	1,878
Leics	—	99	99	2,549	1,747
Lincs (Holland)	—	3	3	25	11
Lincs (Kesteven)	—	25	25	334	142
Lincs (Lindsey)	—	105	105	1,986	1,125
Middlesex	—	16	16	641	307
Norfolk	2	193	195	5,894	4,066
Northants	1	84	85	2,318	1,773
Northumberland	1	67	68	2,329	1,112
Notts	2	158	160	3,560	2,125
Oxford	—	43	43	1,271	1,145
Rutland	—	8	8	138	91
Salop	1	278	279	8,480	4,125
Soke of Peterborough	—	1	1	37	31
Somerset	—	241	241	6,187	2,876
Staffs	2	218	220	6,419	3,442
Suffolk, E.	—	97	97	2,259	1,651
Suffolk, W.	—	51	51	1,054	631
Surrey	—	110	110	3,145	1,448
Sussex, E.	—	179	179	4,414	2,613
Sussex, W.	—	142	142	3,829	2,198
Warwick	1	138	139	3,436	2,113
Westmorland	—	14	14	414	506
Wilts	2	93	95	3,813	1,747
Worcester	—	166	166	3,461	1,580
Yorks, E.R.	3	103	106	1,663	946
Yorks, N.R.	—	118	118	2,356	1,458
Yorks, W.R.	1	272	273	6,667	2,583
WALES					
Anglesey	—	48	48	836	611
Brecon	—	9	9	199	108
Caernarvon	1	112	113	1,800	968
Cardigan	—	29	29	511	358
Carmarthen	—	237	237	4,246	2,167
Denbigh	—	60	60	1,289	641
Flint	—	115	115	2,563	1,125
Glamorgan	3	100	103	1,712	661
Merioneth	—	10	10	125	68
Monmouth	—	55	55	1,321	773
Montgomery	—	15	15	296	222
Pembroke	—	86	86	1,630	1,146
Radnor	—	—	—	—	—
TOTALS	44	6,853	6,897	175,995	95,687

Notes.—(1) Operative periods of undertakings: 1 year, 1,353; 2 years, 605; 3 years, 4,939. (2) Undertakings renewed for a further period: 1 year, 667; 2 years, 139; 3 years, 130. (3) Undertakings not renewed at end of operative period, 397. (4) The figures showing the number of undertakings notified during the month relate to entirely fresh undertakings and do not include undertakings renewed for a further period.

Undertakings which have been cancelled or not renewed are not included in the figures for previous notifications.

County	Undertakings Notified: During Month	Undertakings Notified: Previously	Total Undertakings: Number	Total Undertakings: Number of Cattle: Cows	Total Undertakings: Number of Cattle: Heifers
SCOTLAND					
Aberdeen	1	27	28	1,245	427
Angus	—	21	21	812	395
Argyll	—	6	6	113	115
Ayr	—	39	39	1,257	955
Banff	—	4	4	121	42
Berwick	—	2	2	53	22
Bute	—	—	—	—	—
Caithness	—	—	—	—	—
Clackmannan	—	6	6	180	148
Dumfries	—	14	14	744	613
Dumbarton	—	3	3	105	86
East Lothian	—	3	3	145	88
Fife	—	34	34	1,320	566
Inverness	—	10	10	349	192
Kincardine	—	5	5	231	126
Kinross	—	3	3	59	32
Kirkcudbright	—	17	17	1,032	736
Lanark	—	20	20	683	486
Midlothian	—	1	1	44	69
Moray	—	—	—	—	—
Nairn	—	1	1	14	—
Orkney	—	—	—	—	—
Peebles	—	4	4	54	21
Perth	—	33	33	752	428
Renfrew	—	9	9	384	297
Ross-shire	—	3	3	89	65
Roxburgh	—	—	—	—	—
Selkirk	—	—	—	—	—
Stirling	1	29	30	886	678
Sutherland	—	4	4	76	66
West Lothian	—	1	1	23	18
Wigtown	—	26	26	1,714	885
Zetland	—	—	—	—	—
TOTALS	2	325	327	12,485	7,556

Notes.—(1) Duration of undertakings: 1 year, 47; 2 years, 38; 3 years, 242. (2) Undertakings renewed for a further period (included in column 2 of statement): 1 year, 32; 2 years, 4; 3 years, 5. (3) Undertakings expired and not renewed (not included in column 2 of statement): 51. (4) The figures showing the number of undertakings notified during the month relate to entirely fresh undertakings.

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FOOT-AND-MOUTH DISEASE

Over the week-end the existence of foot-and-mouth disease was confirmed among pigs and cattle at Bilton, Harrogate.

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IRELAND AND ANIMAL DISEASE

Quoting in a recent issue the estimate made by authorities in England that preventible animal diseases cost Great Britain not less than thirty million pounds a year, and that the four major cattle diseases alone—mastitis, contagious abortion, sterility and Johne's disease—involved the agricultural community in an annual loss of twenty million pounds, of which the loss on milk amounted to twelve millions, the *Irish Times* proceeds: "These are the figures for a country which, unlike Ireland, does not claim to be primarily agricultural—a country whose proportionate, and, perhaps, aggregate, livestock population is far smaller than our own. How many million pounds does animal disease cost the people of Ireland every year? It must not be forgotten that the price cannot be estimated altogether in terms of agricultural production. Several diseases—in particular our scourge, tuberculosis—may be transmitted from animals to humans, so that animal health affects intimately the whole problem of public health. Can anything be done to reduce this huge bill? Several things can be done. They will require money, but the profits will justify the investment. In the first place, our whole veterinary establishment appears to be inadequate. In Britain there are 94·4 veterinary surgeons to every million of the larger domesticated animals. Countries more advanced in agricultural science have considerably more—Denmark, for example, has 148, and Switzerland 247·8. We are unable to quote the comparable figure for Ireland; but it is suggested that it may be as low as half the British figure. First of all, then, we require an increased number of qualified veterinary surgeons, who must be encouraged, if necessary, by substantial scholarships. The lack of a sufficient number of practitioners means that animals receive skilled attention only when they are critically ill, and the farmer is forced to pay a fee or lose a valuable beast; regular supervision—designed to prevent diseases instead of curing them—is almost unknown. Secondly, it is agreed by all authorities that a Veterinary Research Institute is needed urgently. The ordinary practitioner has no time for research; but a State foundation, which would conduct research into the common ailments and make the results available to the profession, would repay its cost in a short

time. After the war the market for high-class livestock will be greater than ever. Ireland must be able to offer the best stock in the world."

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IMPORTANCE OF FIRST PRINCIPLES IN THE STUDY OF MEDICINE

Sir John Fraser, Principal and Vice-Chancellor of Edinburgh University, speaking at the reopening of Westminster Hospital Medical School, suggested that there was need to review the balance of undergraduate teaching in hospitals. He expressed the opinion that they were apt to pay undue attention to the presentation of detail and minutiae at the sacrifice of fundamental and general conceptions.

He himself began the study of medicine 42 years ago, but when he reviewed the demands made on the undergraduate of to-day and contrasted them with those which he had encountered, he realised the degree to which detail was being given an increasingly prominent place in the curriculum. He was not expressing criticism of any individual subject in the curriculum. But it would be to the immediate and future advantage of the student if the presentation of the physical and biological sciences that were his introduction to medicine was concerned with those principles which had a bearing on the problem of health and disease, rather than with detail having no direct association with medicine.

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ANIMALS IN WAR

Notwithstanding the mechanisation of transportation for the modern army, states the *Journal of the American Veterinary Medical Association*, situations arise where horses, mules, dogs, donkeys and camels are required to bring up supplies. Frequently, reliability is more important than speed. Galloping cavalry executes manoeuvres otherwise unattainable. Specially equipped mules bring the wounded out of jungles and wooded hills not accessible to vehicles. All of these animals are given proper hygienic and medical care, including modern hospitalisation. Although the ratio of army animals to soldiers is lower than in previous wars, in the U.S. Army the number of veterinary officers and enlisted personnel is higher than that of the last war because, in addition to providing medical care for animals, the Veterinary Corps is charged with the inspection of food of animal origin in packing houses, warehouses and even the farms surrounding military posts which supply milk and meat to the troops.

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MINISTRY OF AGRICULTURE NEWS SERVICE

World Record Claimed.—Before she was three years old, Martona Posch Queen, a Holland-Argentine heifer belonging to the Martona Dairy Company, Canuelas, Buenos Aires, had given, in 365 days, 2,500 gallons of milk which weighed altogether over 24 times the weight of the heifer at the time the test commenced. Her production was registered and checked by the Argentine Rural Society under the Argentine Herd Book No. 05712.

Advantages of Swill Pudding.—Food represents four-fifths of the total cost of pig production, consequently much money can be lost by wasteful feeding or by the use of unsuitable rations. In previous days it took 4 to 5 lb. of feeding meal to increase the weight of an average bacon pig by 1 lb. The bulk of that meal was imported and such small quantities as are now available are strictly rationed.

The value of swill is well known, but a problem that often confronts a pig-feeder is: "shall I collect kitchen waste and prepare it on the farm or shall I buy it already cooked in the form of pudding?"

Here are some essential benefits of feeding properly made concentrated swill.

Firstly, the farmer has a guarantee that the swill has been kept at boiling point for at least one hour and in consequence disease from this source need not be feared. Incidence of disease is one of the greatest of all the pig keeper's fears.

Secondly, he is saved the labour of sorting the swill. In its raw state, swill contains many foreign bodies—tins, broken crockery, corkscrews (there appears to be little use for these at the present time) and other refuse, even coins.

Thirdly, transport is easier. Raw swill is 75 per cent. moisture and it is not an economical proposition to cart three-quarters of a ton of water for every quarter of a ton of solids.

Fourthly, handling is simplified.

Fifthly, the pudding will keep for two weeks in normal weather; and a reserve stock can be held against emergencies. Its feeding value is great—two tons of pudding being equivalent to three tons of boiled swill. The price is fixed at £4 10s. a ton plus container. Many pig keepers are regular users and pigs consider it an excellent meal.

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Better Livestock Demonstration.—Mr. C. Plant's herd of British Friesians at Lolham Mill Farm, West Deeping, Peterborough, was recently used by the Soke of Peterborough War Agricultural Executive Committee as a demonstration herd in connection with the Ministry of Agriculture's drive for better livestock.

A commentary on each animal was given by Mr. W. A. Stewart, Principal of the Northamptonshire Institute of Agriculture, who pointed out the importance of using really good stock bulls, not only of good pedigree and breeding, but, even more important in a dairy herd, possessing good milking records in their ancestors. Without such records it was impossible to assess the value of a bull in improving the herd.

As an example, the bull "Terling Masterpiece" just over two years old was shown and his breeding record described. Milk records for this animal were known as far back as its great-granddam and on its dam's side they went back to that remarkable bull "Terling Marthus," who sired 35 2,000-gallon cows, including 55 Register of Merit daughters. Terling Masterpiece's granddam has given over 14,000 gallons of milk in ten lactations.

In illustration of the importance of the bull and of the capabilities of different types of cow, Mr. Stewart drew attention to the average output per cow in Mr. Plant's herd during the last 17 years. From a figure of 433 gallons per cow in 1927, the average rose to over 1,100 gallons in 1937, and in 1943 was 1,500 gallons per cow.

Commercial farmers, said Mr. Stewart, whose interest lies solely in milk production and not in rearing pedigree stock for sale could not buy such expensive high yielding cows as those that have been shown; they could, however, build up a self-contained pedigree herd. The best way to start was with good non-pedigree animals using a first-class pedigree bull with good family milk records, and gradually grade up through the Supplementary Register into the Herd Book. Under this scheme the heifer calves from the fourth top cross by a pedigree bull are eligible for entry into the Herd Book and would become registered pedigree cows. Apart from the improvement in production that is obtained, the value of the cows in the herd increases progressively.

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Quinine.—Cinchona bark is the raw material from which quinine is made—the standard medicine for the prevention and cure of malaria.

Colonel Arthur Fisher, who 20 years ago was head of the Philippines Bureau of Forestry, established cinchona plants in those islands. After Pearl Harbour Colonel Fisher at the risk of his own life spirited two million seeds out of the islands. They were packed in a milk can, flown to Australia and then to Washington.

That shipment of seeds is already paying big dividends. Grown in United States Department of Agriculture greenhouses, thousands of seedlings from these seeds have gone to tropical America by aircraft, for planting in those countries.

Because of those seeds, rescued from under the very noses of the Japanese, many an American doughboy or British Tommy fighting in the jungles of the South Pacific will have a better chance to survive the dangers of malaria.

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PHYSIOLOGY OF MAMMARY DEVELOPMENT

In both the process of development and functioning the mechanism of lactation is under the command of the endocrine system. The two ovarian hormones, oestrogen and progesterone, cause the growth of the lobules, ducts and alveoli, although in some species perhaps including the cow, oestrogen alone is capable of producing complete development. The extent to which the hypophysis participates in mammaryogenesis is controversial. The accelerated growth of a mammary gland brought about by topical application of oestrogen to a developing mammary gland is pointed out as evidence that the ovarian hormones are not dependent upon the pituitary hormones but that, on the contrary, they act upon the hypophysis to produce the mammaryogenic stimuli. Pituitary hormones, however, are necessary to the complete development and functioning of the mammary gland, acting through the intermediary of the thyroid and adrenals, each having regulatory roles. Critical studies reveal that all the hormones concerned in the well-being of the animal economy contribute to mammary growth. The interaction is complicated, involving the pituitary, thyroid, adrenal, ovarian, luteal, and placental hormones. In the cow, the synthetic oestrogen, stilboestrol, not only causes complete mammary development but also starts lactation in sterile heifers even to the probability of producing satisfactory milk production. Its action in the multiparous cow is less pronounced but the reason for the difference is not known.—*Veterinary Science News Letter*, abstr., Proceedings Indiana Veterinary Medical Association, January, 1944.

The Demobilisation Committee of the Central Medical War Committee has made specific representations to the Government regarding the demobilisation of doctors who have been in the Forces for a long period and a statement of the Government's policy is awaited.

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Changes in the war situation have made possible the publication of British agricultural statistics about war-time production. These have been made public by the Ministry of Agriculture, and relate to acreage of crops and grass, crop production and livestock population." Separate figures are given for the United Kingdom and for England and Wales. The number of cattle has increased in England and Wales between 1939 and 1944 from 6,770,000 to 7,209,000; sheep and lambs have declined from 17,986,000 to 12,632,000, pigs from 3,515,000 to 1,467,000, poultry from 56,426,000 to 31,907,000 and horses from 1,079,000 to 918,000.

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Sir George Courthorpe, M.P., President of the Royal Agricultural Society of England, announced at a recent meeting of the Council of the Society that there will be no Royal Show at Lincoln in 1945. It had been hoped to hold it next summer, but transport, labour and other difficulties have made it impossible. The show will be held at Lincoln, it is hoped, in 1946, and will go to Plymouth in 1947.

CORRESPONDENCE

The views expressed in letters addressed to the Editor represent the personal views of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

Letters to the Editor should reach the Office not later than by the first post on Monday morning for insertion in following Saturday's issue.

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ABORTION VACCINES

Sir,—I was concerned to read, in the report of the N.V.M.A. Council meeting held on July 20th, the resolution from the Royal Agricultural Society of England concerning abortion vaccines. The resolution, it will be recalled, ran as follows:—

"The Council of the R.A.S.E. wishes to express its gratification at the report that it has now been proved to the satisfaction of the A.R.C. and the M.R.C. that the vaccine called S19 is efficacious in protecting cattle against contagious abortion, and also that the inoculation causes no danger to the milk supply. . . . This Council considers that the moment has arrived for all possible steps to be taken by the M.o.A. to ensure that all non-pregnant cattle be vaccinated. . . . The Council is also of the opinion that the sale of all other vaccines should be made illegal."

One has grown used to data being made available to the lay public before it is laid before the profession. It is a much more serious state of things, however, when such lay bodies should endeavour to advise on veterinary matters to the profession.

But there are further issues than this at stake. This seems the culmination of several queer happenings in the abortion vaccine world. What are the facts made available to the profession? We know that Dr. McEwen, having produced a vaccine (now referred to as vaccine No. 2) which was found to protect effectively laboratory animals, organised a very wide field experiment. Whilst I was working in Leeds I was privileged to be one of those who co-operated in these field trials, as were a number of practitioners in the S.W. area. Our impressions seem to have been fairly unanimous. The experiments, which lasted over several years, must have been amongst the most efficient conducted in this country. Although many thousands of cattle of all breeds and in all parts of the country were involved, every animal was regularly blood-tested and every service and calving date recorded along with notes concerning abortions, vaccinations and other relevant data. It seemed to us that the vaccine was nearly 100 per cent. efficient, that it did not stimulate the production of agglutinins in the blood, and that no ill effects from the injection were noted. Infertility did not follow injection and although doses had to be administered annually, this did not involve more than one visit a month to any one farm. We hope to see McEwen's work published showing in detail the results obtained. That was the position at the end of 1941.

About this time strain 19 appeared, a vaccine produced in America for use in calfhood vaccination. This method of control is known to be very valuable, but there was no guarantee that the vaccine would be as efficient in this country. We know by way of comparison that the Americans claim much better results in the treatment of mastitis than we have been able to obtain in this country under similar conditions. Even before there was time for adequate field experiments to be carried out in this country the vaccine was being boosted, not only for calfhood vaccination, but also for use in adult cattle. This seems a dangerous procedure. No work had at that time been done in this country to show the advantages over vaccine No. 2. Claims were made that one injection would protect a cow for life, but to date no evidence has been offered in support of this. On the other hand there is evidence to show that the use of vaccine No. 1 in adult cattle is contra-indicated. Many practitioners have reported severe reactions to injections, and rumours of consequent deaths have been heard. No evidence has yet been accumulated to show whether infertility follows the use of No. 1 such as followed the use of the old live vaccines. Already we are meeting cases in which credulous farmers have been sold reacting cattle on the strength of the unsubstantiated tale that the cattle have been vaccinated with strain 19, and already owners of valuable pedigree cattle have been unable to sell stock that is still reacting to an earlier vaccination.

Birch *et al.* (*Cornell Vet.*, 1943. **33**. 2. p. 198), experimenting with the use of strain 19 in adult cattle, concluded, "Because strain 19 is known to possess a degree of pathogenicity and because, acquired by ingestion, it has produced typical brucellosis in a mature pregnant cow, prudent veterinarians will not advise their clients that there is no danger connected with its use in vaccinating the calves in clean herds; neither will they advise its use in mature cows. Any brucellosis that develops in a clean beast following the use of vaccine in it, is likely to be charged, rightly or wrongly, to the vaccine, and the veterinarian who has stated that there is no danger connected with its use will be in a very weak position."

Gilman (*Cornell Vet.*, 1944. **34**. 3. p. 193) describes a case of undulant fever produced in a student who contaminated himself whilst injecting cattle with strain 19, and gives data to show that the causal organism was similar to strain 19.

It seems that the only data available supporting the use of strain 19 in adult cattle in this country is a limited and rather artificial experiment conducted under the aegis of the A.R.C. and not yet reported in the veterinary press. Against this must be weighed the massive evidence of the field trials showing the value of No. 2 vaccine. Reports of breakdowns in connection with the use of this latter vaccine have, in my experience, been almost entirely explicable by the fact that a large number of practitioners have not yet realised the utter futility of vaccinating cattle that are already infected and are reacting to the blood test.

Were the supply of No. 2 to be stopped many practitioners would find themselves in a difficult position when asked for advice by owners, of herds free from abortion, who have become alarmed by the presence of the disease in the neighbourhood. The general advice given in such cases is to use No. 1 on the calves and No. 2 on all non-pregnant adult stock; in the experience of many practitioners this has proved to be a very satisfactory control scheme.

I feel that we owe a debt of gratitude to Mr. Steele-Bodger for taking a very definite stand against the suggested measures.

Yours faithfully,

21, Aberdeen Road, Bristol. R. W. Roach.

[On the evidence at present available, Council, N.V.M.A., has not felt able to accept the resolution of the Royal Agricultural Society of England.—*Editor.*]

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THE FUTURE OF THE R.C.V.S.

Sir,—The future of veterinary education is now being considered in many of its aspects which will undoubtedly affect the status of the R.C.V.S. Whether or not the R.C.V.S. will continue as at present or will function in the future under a different guise, I venture to make the following suggestions.

The R.C.V.S. acts in the capacity of a body which grants a licence to practise by its examinations and has certain disciplinary powers over its members. Is there not greater scope for its activities? Is it too far fetched to imagine that at a distant date the Royal College of Veterinary Surgeons might occupy a comparable position to the Royal College of Surgeons? Supposing all difficulties were overcome, what could be done along these lines? Let us, therefore, use a little imagination. This new Royal College could add to its stature by incorporating in its foundation research work. Research chairs might be established, *e.g.*, in Comparative Anatomy, Pathology and Physiology. The College also would surely be the most suitable place for a Registry or "Museum" of Comparative Pathology, and if such a one in pathology, why not another "Museum" of Comparative Anatomy? Further, research studies cannot proceed without a good library, so why not give this new and august Royal College of the future a first-class library by transferring the Imperial Bureau of Animal Health?

It is easy to indulge in visions, but after all it is vision and foresight that is now required by the profession. These suggestions,

therefore, are not surely too fantastic. If these or other extensions of scope of the College were realised, its dignity would be raised in all directions and it would become a cultural foundation of a high order.

Yours faithfully,

Imperial Chemical (Pharmaceuticals) Ltd., J. R. M. Innes.
Hexagon House, Blackley, Manchester, 9.
October 11th, 1944.

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STANDARD OF EXAMINATIONS

Sir,—Having myself on occasion been misreported—not, I hasten to say, in your columns—I can sympathise with my friend Mr. Gould in what is always an aggravating experience.

Naturally I accept unreservedly his explanation as published in to-day's *Record*, remarking, if I may, that it is more in keeping with Mr. Gould as I know him than the previous unfortunate report.

Miss Joshua in her letter recalls certain incidents in her student days. My own experience partly, but only partly, confirms Miss Joshua's recollections. She says, "The inference is obvious." But if the facts are incomplete the inference may be erroneous. Even as it is it seems to me that several inferences may be drawn. What these are is a question which I could not discuss publicly without committing a breach of confidence.

Yours faithfully,

Cruachan, Rutherglen. Donald Campbell.
October 14th, 1944.

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BOVINE TUBERCULOSIS DUE TO UDDER IRRIGATION

Sir,—The article (*V.R.*, October 7th, 1944) on "An outbreak of bovine tuberculosis due to udder irrigation" does not give any data as to how the infection got into the irrigation instruments. There must be some method of detecting the entry thereto. It is possible that it or they had been used previously on an udder infected with tuberculosis and the culprit animal, therefore, should be detected.

Yours faithfully,

Sherwood, Merthyrmawr Road, J. Howard Jones.
Bridgend, Glam.
October 10th, 1944.

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VETERINARY PROGRESS IN AMERICA

1. The Cine Film as a Teaching Technique; II. Pathology

Amidst the welter and hubbub of professional politics which now surrounds us it might be a welcome diversion to call attention to two matters which are of some interest in considering the future of veterinary education and research. After the war, quite apart from any other steps that might be taken to improve veterinary science and education, it seems that at least fresh ideas will bear on different aspects of our professional life. In the August number of the *Journal of the American Veterinary Medical Association* there are two items recorded to which I should like to draw attention, in the hope that they will cause some reflection by those in authority whose concern it is to direct teaching and research. Just as in so many other branches of our national life, it well behoves us not to ignore steps of progress which are being taken by the veterinary profession in the States.

1. The Cine Film in Veterinary Teaching.—In the number of the journal quoted there is an article by A. G. Boyd entitled "Advancement of Veterinary Medicine through Motion Pictures" in which he gives a brief account of what might be done with the aid of films in veterinary teaching institutes. This idea is not, of course, new, and most teachers of pre-clinical and clinical subjects related to human and veterinary medicine would agree that in the years to come the motion picture will play an increasingly important role in the teaching of students. There is already a demand from teachers in the medical sciences for films which enrich and clarify subjects by visual film demonstration. Particularly in clinical medicine, surgery and pathology the veterinary student has often had to rely on the dreary method of trying to visualise symptoms and pathology of disease by the use of his imagination and deductions from wearisome descriptions given by lecturers who are handicapped by the fact that animal cases cannot be produced at short notice to demonstrate either the living or the dead diseased subject. It is well known how much more vivid a lecture on any subject can be made when illustrated by cine films. Films on veterinary subjects have, of course, other values which need not be gone into here, but films on animal disease might also serve in the future as an historical record of conditions which may disappear with or without the intervention of man; they might also serve as a means of placing on permanent record scientific observations, and also as a means of propaganda on animal health. Little more need be said about this, except to point out that the American Veterinary Medical Association have appointed a special committee to obtain information on establishing a veterinary film library. Active steps are now being taken in this country to promote the production of a large number of films dealing with pre-clinical and clinical medical subjects. It would appear that there is a need for something similar in veterinary work and, as has happened in the States, it might be better if this was arranged, sponsored and organised through official channels; the most suitable one would appear to be the N.V.M.A.

11. Pathology.—For many years at various times and in different places I have pleaded for better recognition of pathology and for more importance being given to the subject in veterinary teaching and research. It is not the place here to define what pathology is, what its scope is, or why pathology in veterinary work has received such inadequate attention. This, I hope, will be dealt with elsewhere at a future date. I shall, however, state that there are few diseases of animals (including those which are regarded as important problems by the bacteriologist, the epidemiologist and those who hope to control the incidence by some means or other) which would not profit by investigation designed to reveal more information of the true nature of the disease (*e.g.*, tuberculosis, bovine mastitis, sterility, etc.). One need only read any standard text-book on veterinary medicine and pathology to see how true this is, and there must be many diseases of animals, the pathology of which has never been investigated at all. We indeed need a new veterinary pathology. How this could best be achieved rests in the hands of the pathological teaching departments of our colleges. It is, therefore, very gratifying to know that in one veterinary college at least there is in process of being built up a pathological department which is something more than a mere name, and of which much will be heard in years to come.

If one compares medical with veterinary pathology two features stand out regarding medical progress, and which are often forgotten. First of all, it is by virtue of bulk of pathological studies carried out over years that authoritative knowledge is built up and accurate knowledge is only gained by adoption of detailed rigorous methods of investigation. Veterinary pathological departments in this country have not followed the example set by many eminent medical institutions, and we neither have available records relating to a large volume of *post-mortem* material, nor is it certain that diseases of animals in veterinary pathological institutions have been investigated with the same thoroughness as has happened in the case of diseases of man. This theme might form a basis of an essay dealing with the place, function and future scope of veterinary pathology, and an analysis of its lustreless past. The many contacts I have had in the past with medical pathologists who have come seeking information and records on animal diseases so that comparisons could be made with certain human diseases convinced me long ago of what was urgently wanted in the animal field. This is a "bureau," "museum" or "registry" of information complete with adequate pathological records, specimens, slides and radiographs, etc., dealing with spontaneous animal diseases and in large numbers. Such a "museum" would enable workers to do real research in comparative pathology, but it also would have its own innate veterinary worth for teaching and research. But where, for example, at the moment is it possible for anyone interested to see, inspect and study pathological records, specimens, slides, radiographs, of diseases fully investigated clinically and pathologically, and dealing with 100 to 200 or more cases of any animal condition, whether it be a bacterial, virus, parasitic, metabolic or organic disease of the brain, blood, lungs, liver and bones of domesticated animals?

In the same number of the *J.A.V.M.A.* there is another communication which I consider of considerable moment for the future of veterinary pathology at large, which redounds to the credit and foresight of certain veterinarians in the States, one of whom I am certain is the well-known Dr. W. H. Feldman. This concerns an arrangement which has been approved by the Surgeon-General of the U.S. Army and the Board of Governors of the American Veterinary Medical Association for the establishment of a registry of veterinary pathology at the Army Medical Museum, Washington. (See *Vet. Rec.* **56**. 379.) Quite obviously this Registry in the States is going to fill a very badly needed want. I again, therefore, hope that this foundation which is to be built up in the U.S.A. will give cause for reflection by veterinary authorities in this country, some of whom I know have sympathetic feelings towards more and abundant encouragement of pathological research on spontaneous animal diseases.

Yours faithfully,

"Seodin," Chester Avenue, J. R. M. Innes.
Hale, Cheshire.
October 5th, 1944.